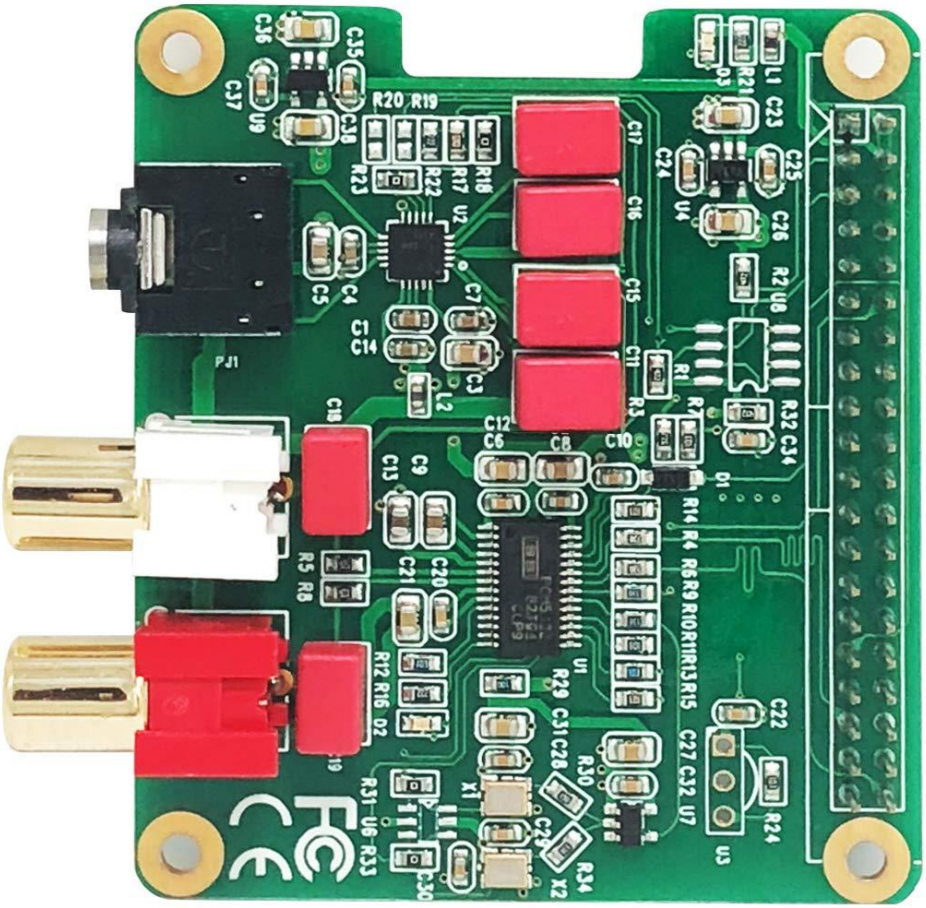
HIFI DAC HAT UserManual



目录

1. General

The Innomaker HiFi DAC Hat is the best optimized partner for RPI audio output. Used on-board PCM5122 as the IIS clock master , instead of the clocks from RPI which comes with too much jitter. Added dual low jitter oscillators(45.158M and 49.152M) to support more exact sample rate clocks. No soldering, no additional cables. Just plug it in and do some simple configuration, You can get a same high-class music player, but only pay 1/10 to 1/100 of the market price.

2. Features

1. Compatible with Raspberry Pi Zero,Zero W,3B,3B+with the 40-pin connector. Connects directly to the Raspberry Pi board, no additional cables required,no soldering. Easy to get more beautiful and fantastic sound by this RPI+DAC HIFI suits.

2. Absolutely perfect to support all Raspberry Pi music playback system ,such as LibreELEC, OSMC, Max2Play, RuneAudio, Volumio, Moode, PiCorePlayer, PiMusicBox, OpenELEC, Raspbian, Ubuntu etc. Support play music from a hard disk or over the network. Support DSD over PCM(DOP)mode.

3. Class-leading stereo audio DAC PCM5122, sample rates up to 384-KHz/32-Bit. Paired with stereo high fidelity headphone amplifier TPA6133. Provides 2.1Vrms ground-centered outputs coupled with Film capacitor.

4. On-board a pair of gold plated RCA (LEFT &Right) jacks and a 3.5mm high-end headphone jack output, allow you free to play your music through Raspberry Pi to another terminals.

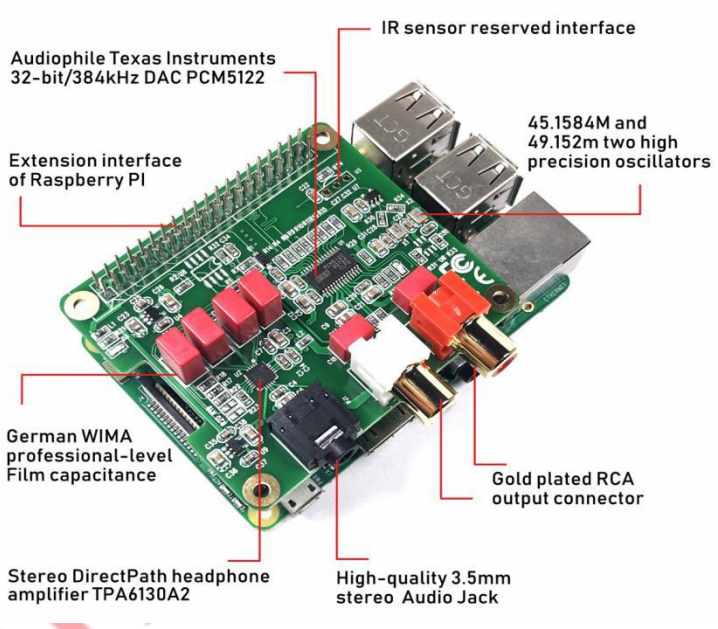
5. Comes with software, document and friendly technology support. For more information please refer to our wiki（view the link on color page comes with the goods).

6. On-board EEPROM and Infrared receiver extended function(Default no soldering)

3. Hardware Description

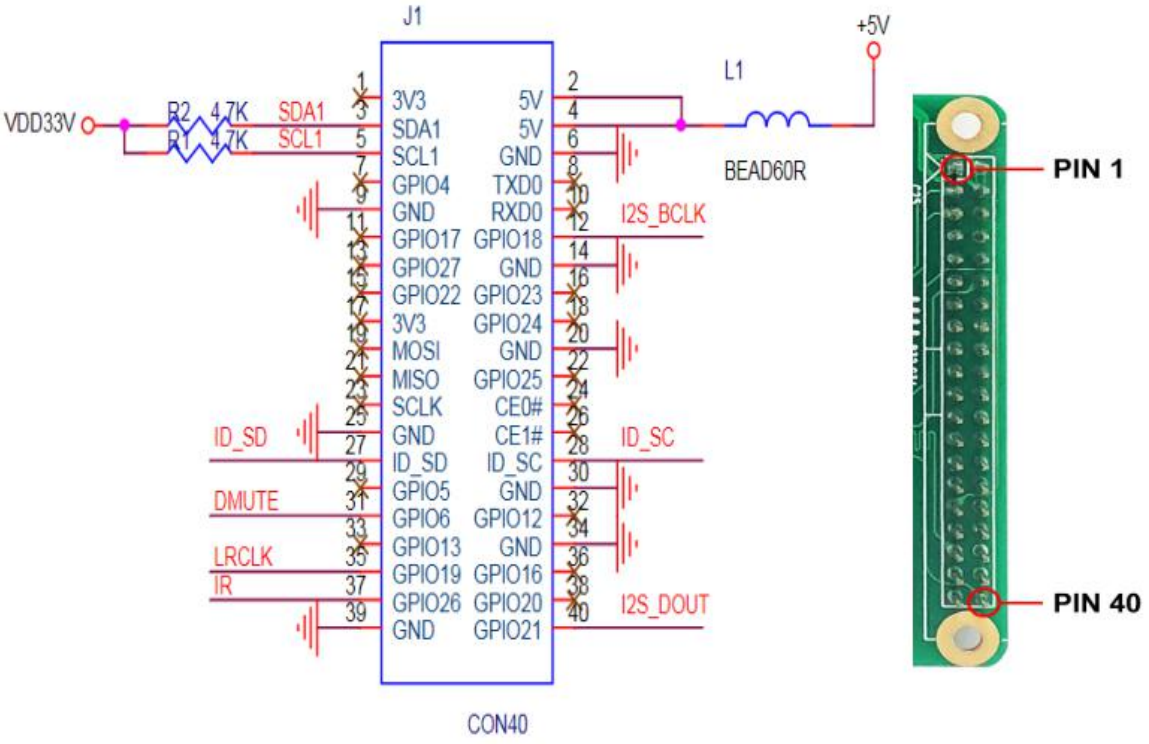
Connect the HIFI DAC HAT module and RPI with 40 pin connector .While installing the module attention to align the first leg of the raspberry pi and HIFI DAC HAT module.

3.1Overview



3.2 PINOUT USAGE- FEMALE CONNECTOR

1) 40 PIN Interface Schematic



2) 40 PIN Interface Description

PIN	Symbol	Description
2, 4	+5V	+5V Supply Pin, connected to the main 5V supply of the Raspberry Pi
3	SDA1	SDA Used for DAC and EEPROM
5	SCL1	SCL Used for DAC and EEPROM
12	GPIO_18	IIS_BCLK
31	GPIO_6	Mute function control pin
35	GPIO_19	IIS_LRCLK
37	GPIO_26	Infrared receiver reserved port
40	GPIO_21	IIS_DOUT
27, 28	ID SCL and ID SDA	Reserved for an ID EEPROM on the Raspberry Pi. These pins are always reserved and should never be used to connect external components

6, 9, 14, 20, 25, 30, 34, 39	GND	Ground Pin, connected to the main system Ground of the Raspberry Pi
The remaining pins are unused, You can use them for your other hardware boards.		

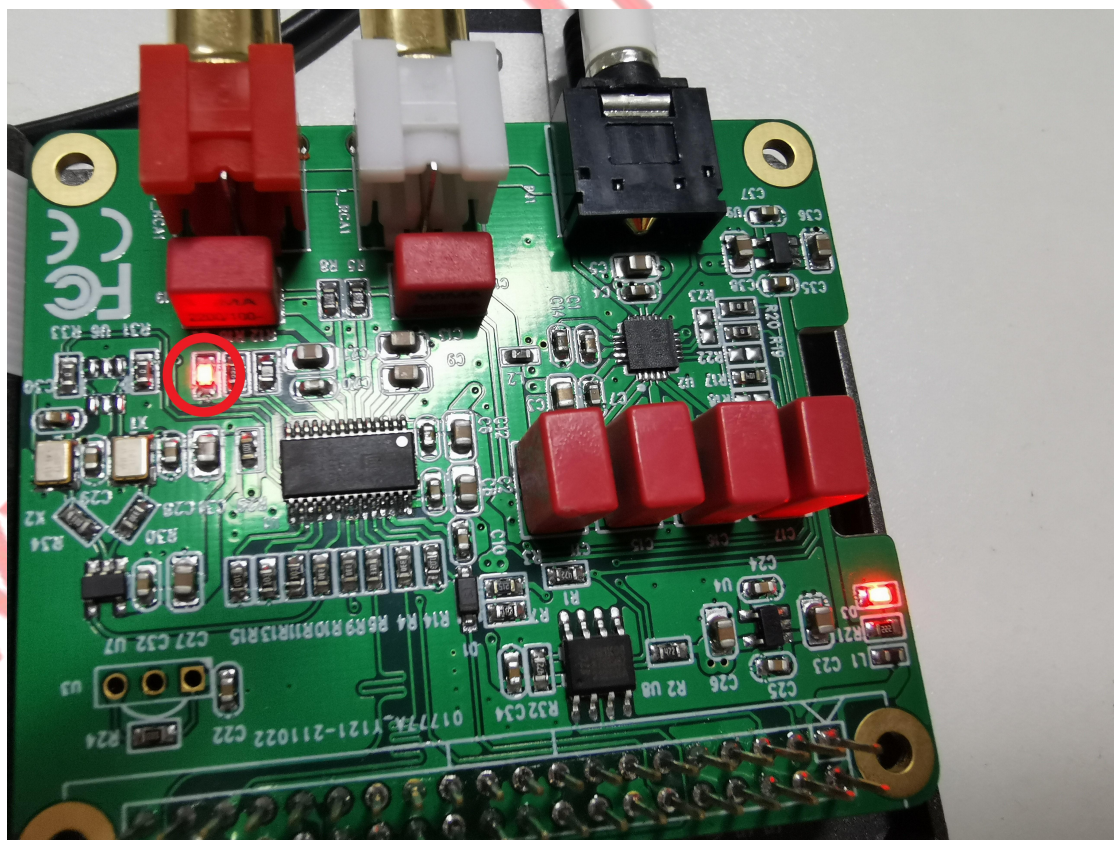
For more information about GPIO of Raspberry PI, please refer to below link:

https://www.raspberrypi-spy.co.uk/2012/06/simple-guide-to-the-rpi-gpio-header-and-pins/#prettyPhoto

https://docs.microsoft.com/en-us/windows/iot-core/learn-about-hardware/pinmappings/pinmappingsrpi

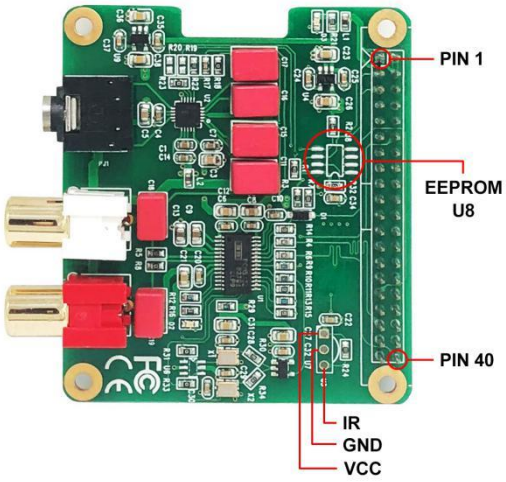
3) Indicator Light

When the DAC module driver is install successfully and be detected, below red led on-board should be on.

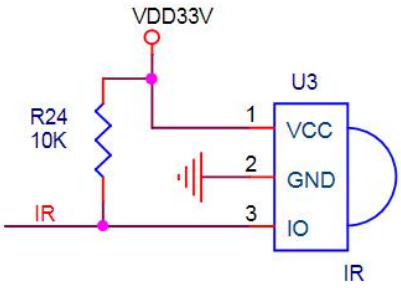


3.3 Extended Function

We reserved some function for customer DIY by themself.

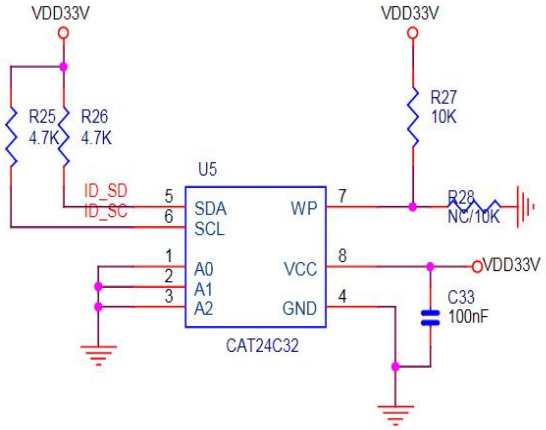


1) Infrared Receiver Function: (U3,No Soldering On-board)



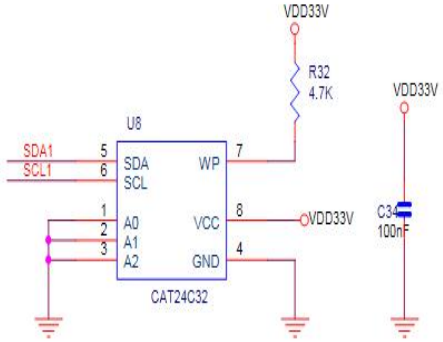
IR is connected to PIN37(GPIO_26) , But we have no software for it right now. We will release new software version after finish it. If you have any advices please feel free to E-mail to us.

2) ID EEPROM: (U5, No soldering on-board)



Pin 27 and 28 are always reserved for an ID EEPROM on the Raspberry Pi. Independently which card you use. It's useless for most application. If you want to use this function, you need to solder the IC, resistance and capacitance by yourself.

3) USER EEPROM: (U8 No soldering on-board)



It connected to the same IIC port with DAC. you need to solder the IC and Confirm IIC slave devices. If you a novice of Raspberry Pi, We really wouldn't advise do that.

4. Software Description

4.1 Overview

HIFI DAC HAT module compatible with many Raspberry pi music playback system such as:
OSMC / Max2Play / RuneAudio / Volumio / Moode / PiCorePlayer / PiMusicBox / OpenELEC etc.
You can choose your favorite. We take **Volumio/MoOde/LibreELEC/Max2play/Raspbian/OSMC** Preset System for Example.

May I draw your attention below:
1) Because the third party will update the version unscheduled, so the actual UI may different from below user guide. But the configurations will be the same. If you meet any problem, you can Check the user help on the website of the third party or feel free to e-mail to our support team (support@inno-maker.com).

2) The default sound is loud of most system, it' will offensive your ears. So please turn down the volume before you enjoy it.

3) For some music systems that are not listed, you can try to set as below step. Many thanks to the friendly customer named 'HoweTechnical' write it down on our Amazon review page.

a. SSH into your RPI (won't go into how to do that, Google it if you need)

b. Type "cd .." and press enter (no quotes)

c. Type "mount -o remount,rw /flash" (no quotes) to remount the flash directory as rewritable

d. Type "nano /flash/config.txt" (no quotes)

e. Arrow down to the bottom and type this at the end: dtoverlay=allo-boss-dac-pcm512x-audio

f. Press ctrl+x, choose y (for yes, to overwrite the file) and press enter

g. Type "reboot" (no quotes) to reboot the system

h. Now in Kodi, to into Settings - System Settings - Audio and choose the default output device of, "ALSA: Default (BossDAC Analog)

4.2 Download Image from website

Download the lastest image for Raspberry PI:

Volumio Image:
http://volumio.org/get-started/

MoOde Image:
http://www.moodeaudio.org/

LibreELEC:
https://libreelec.tv/downloads/raspberry/

Max2Play Image:
https://www.max2play.com/en/max2play-image/

Raspbian and Raspbian lite Image:
https://www.raspberrypi.com/software/operating-systems/

OSMC:
https://osmc.tv/download/

4.3 Load Image on to SD card.

Prepare a capacity of at least 16GB TF card and a card reader.Load the image file onto a SD card, using the instructions provided on the Raspberry Pi website for Linux, Mac or PC:
https://www.raspberrypi.org/documentation/installation/installing-images/README.md

4.4 VOLUMIO Setup

Volumio is an entirely new music system. It is designed to play all your music, whether is an Hi-Res file or a Web Radio, with the highest quality. Control it with your favourite device, a smartphone, PC or tablet, and enjoy your music as you never did before.

Volumio is a Free and Open Source Linux Distribution, designed and fine-tuned exclusively for music playback. I supports all filetypes: FLAC, Alac, Aac, Vorbis, Mp3, DSD etc. and support

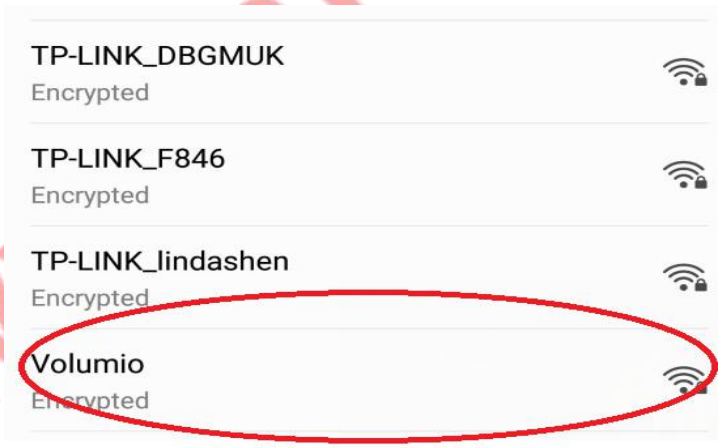
By flashing (installing) Volumio on any platforms, it will then become a headless Audiophile Music Player. Headless means that the only way to control it will be with another device, such as a Smartphone, Tablet, PC or anything that has a browser.

For more detail please refer to https://volumio.org/discover/.

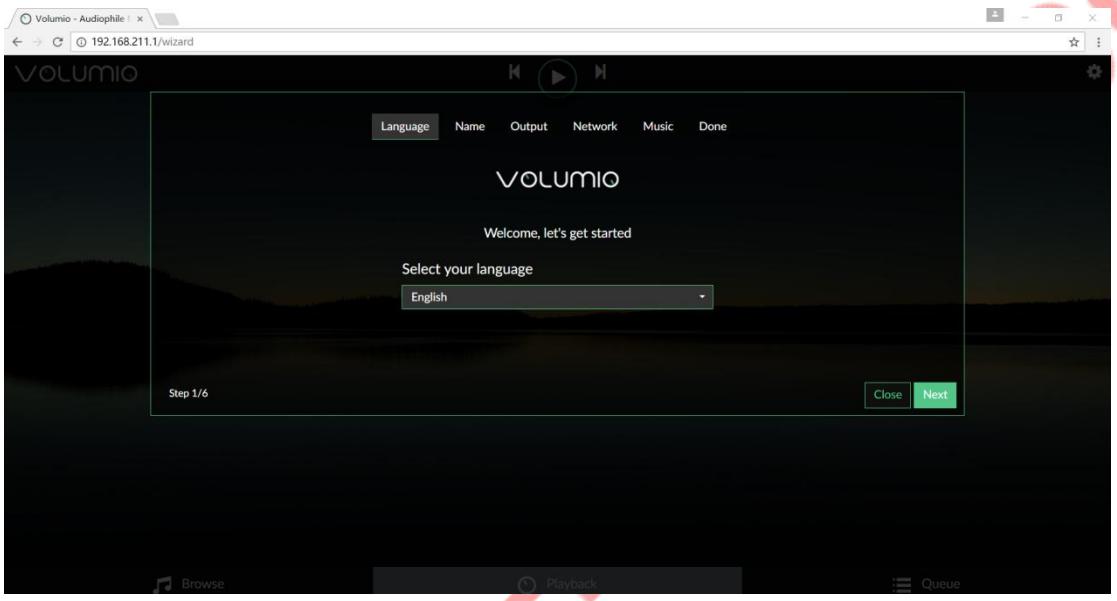
STEP:

1) Insert the TF card with volumio image into the Raspberry pi then power on.

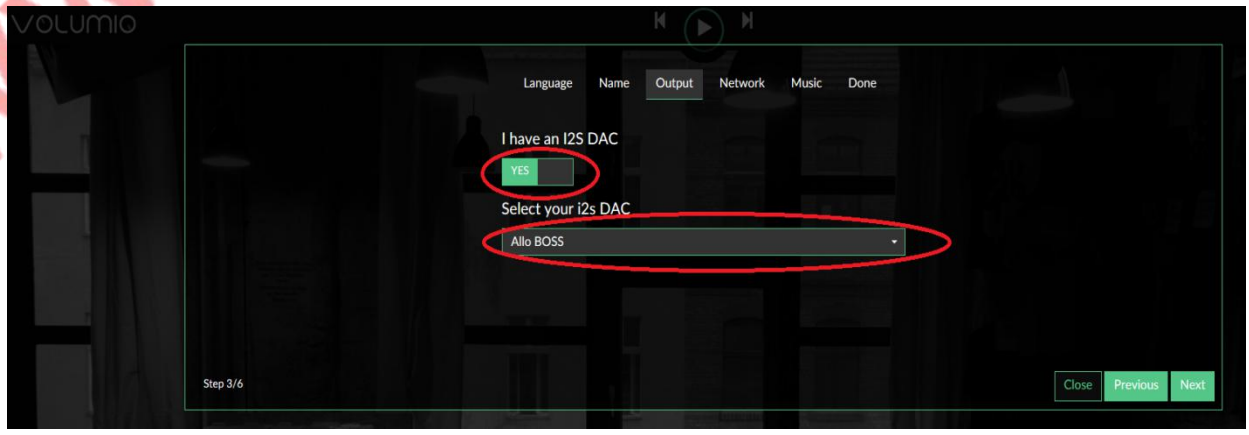
2) By using your smart phone, tablet or any device with WIFI and browser search for WIFI hotpots. You can see a 'Volumio' name in the search list. Connect this hotspot with password 'volumio2'. You can change your password after login.



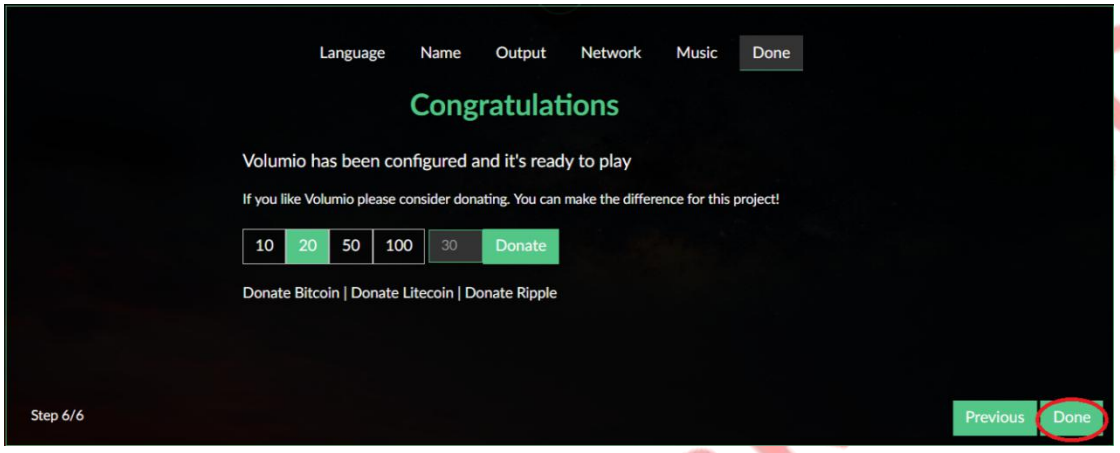
3)The browser will automatically eject playback software UI which is based on web interface (if you connect the hotspot successfully but for some reason browser can't pop up the playback page automatically, you can using http://192.168.211.1 to login. You can see below wizard of Volumio. We only need to set "Language" , "Name" "Output" and "Done" for simple application.



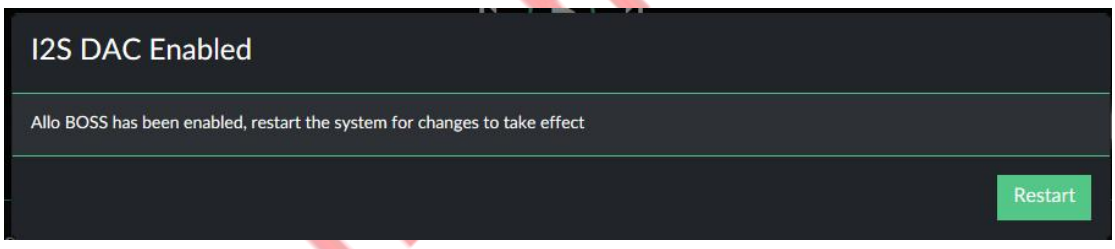
4)It should be noted that 'Output' page must set as below. This is an essential step, otherwise you can't hear anything.



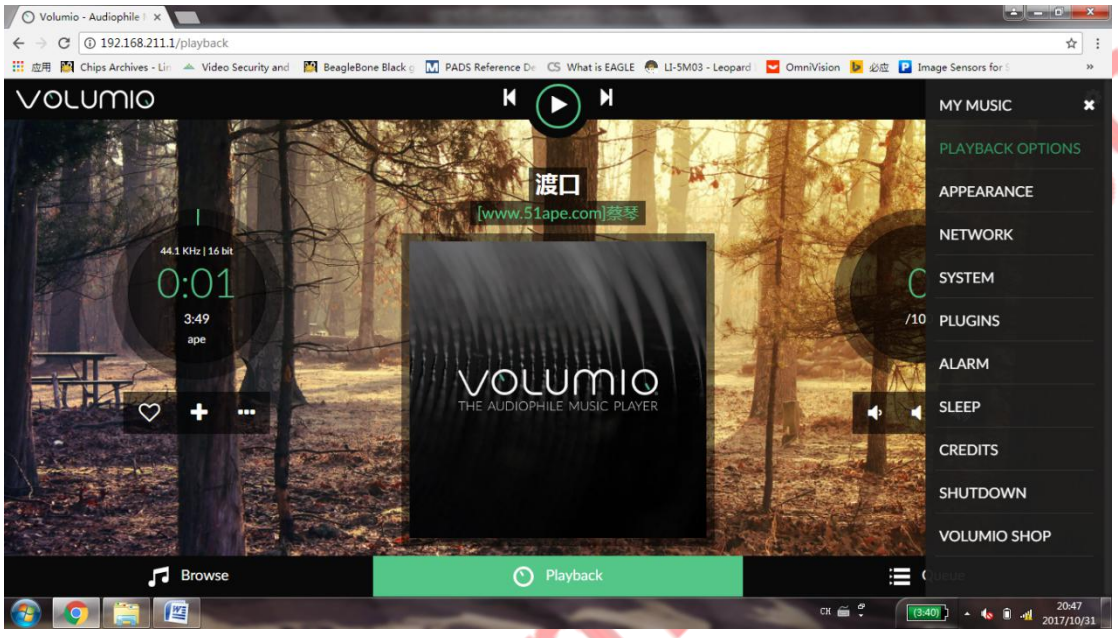
5)In 'Done' Page, you can see a request for donations from Volumio. It's depand on you. You can give them some help if you like this application. Gifts of roses, hand a fragrance.



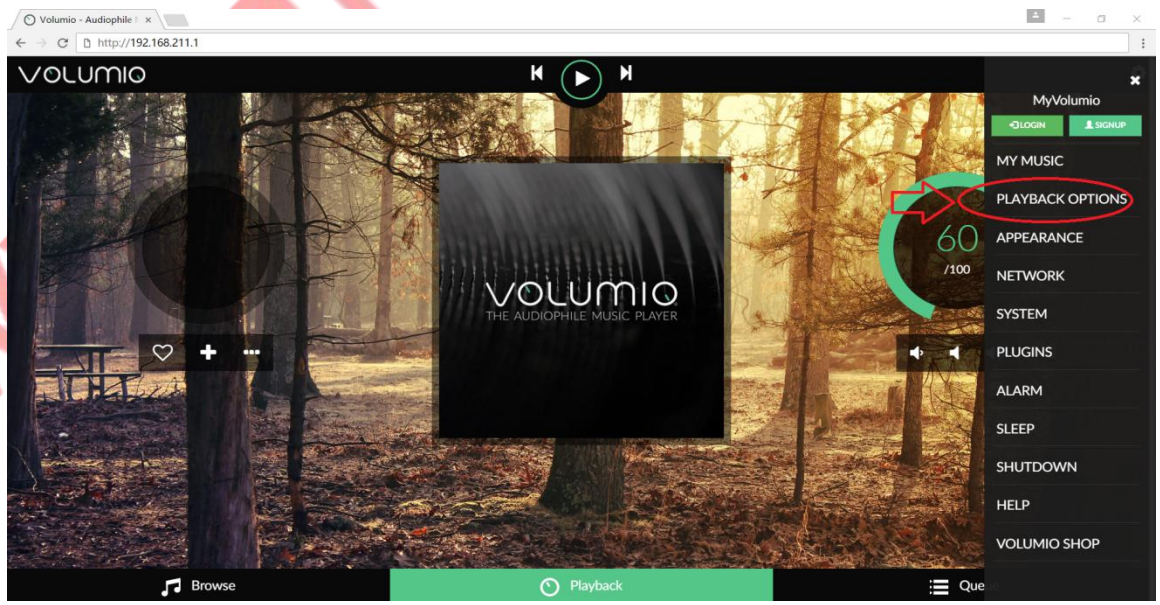
6)Click 'Done' to finish initialization of Volumio. And then restart Volumio.



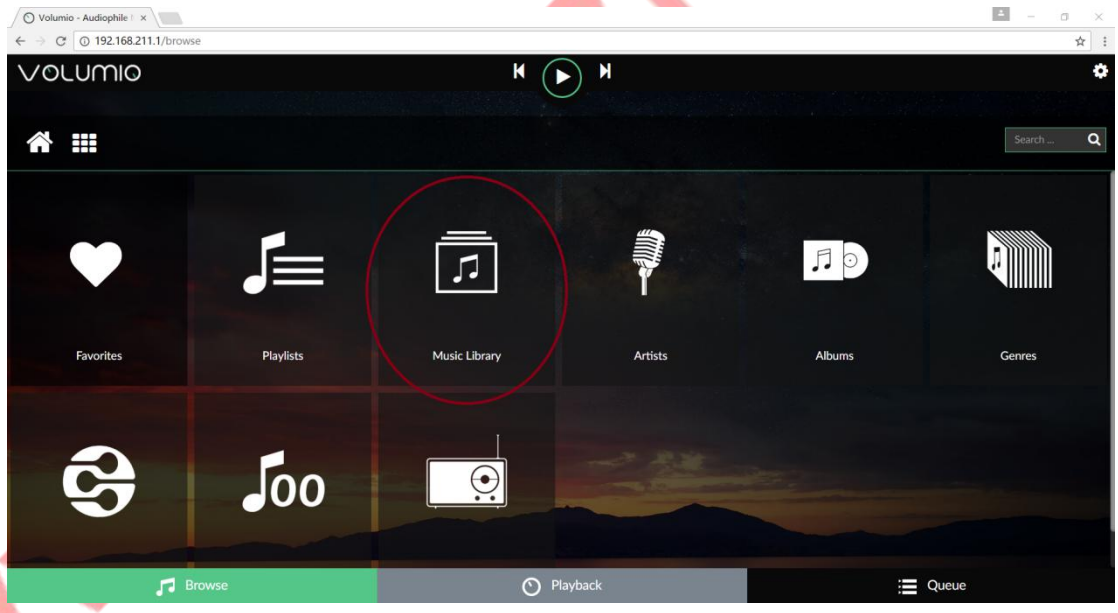
7)In this restart process, “Volumio” hotpot will turn off for a moment. Sometimes your mobile phone or Tablet or PC will automatic connect to other. You need to set back to ‘Volumio’ hotpot. After restart you can see the main page of Volumio.

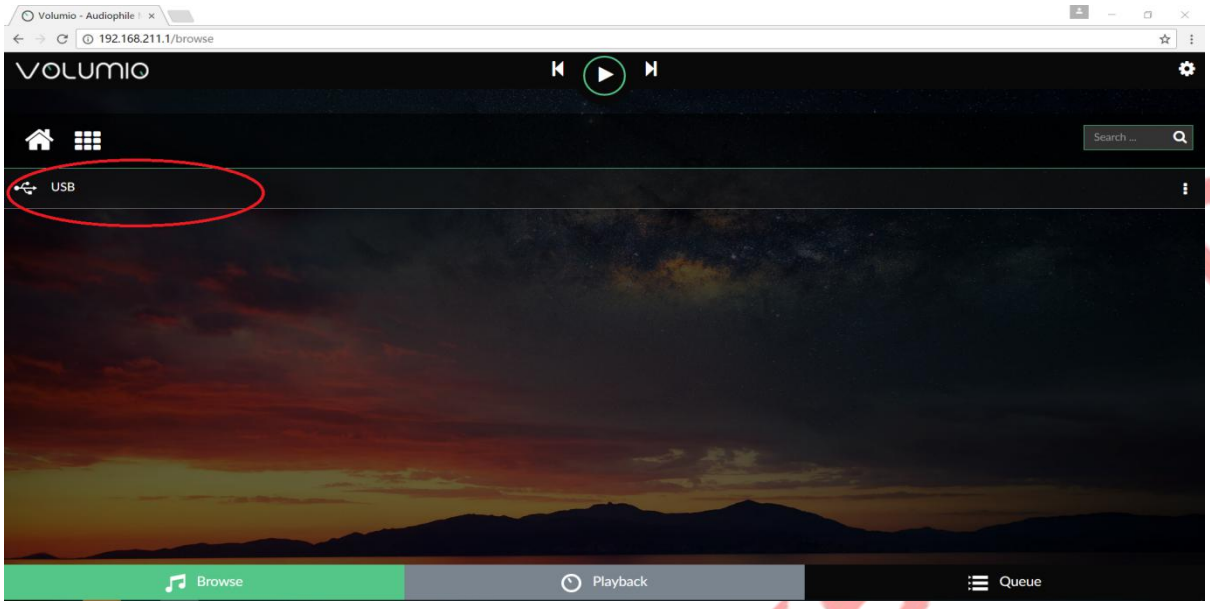


8)If you can't play music properly, please Click ‘Setting’ → PLAYBACK OPTION, check the output setting as below picture. This is an essential step, otherwise you can't hear anything.



9)You can insert the USB Disk or mobile hard disk with your own audio file into Raspberry Pi USB connector, and find the music list of your USD disk in “Music Library”.

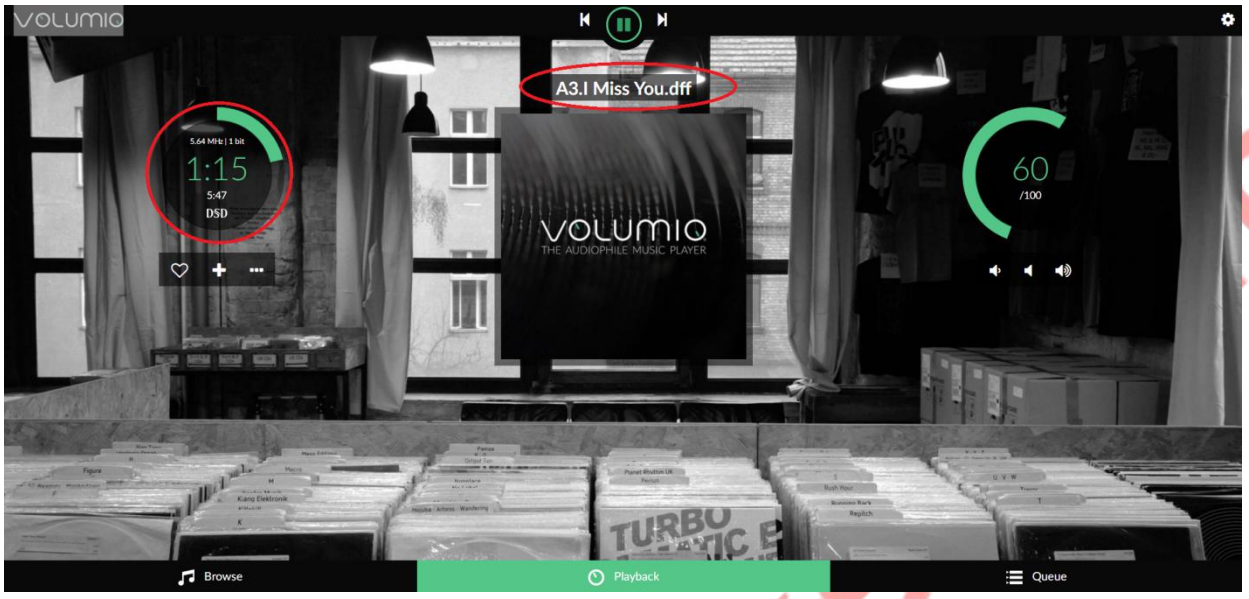




4.5 VOLUMIO Play DSD Music Files

DSD64, DSD128 AND DSD256 are now natively supported in direct DSD mode on Volumio.
For more DSD information please refer to Volumio link:
https://volumio.org/direct-dsd-support-volumio-dsd512/
Please set 'General Playback Options' mode as below picture:

Restart and enjoy DSD music.


VOLUMIO
A3.I Miss You.dff
5.64 MHz | 1 bit
1:15
5:47
DSD
VOLUMIO
THE AUDIOPHILE MUSIC PLAYER
60
/100
Browse
Playback
Queue


VOLUMIO
Purely (DSD)
不忍告別
陳潔麗 Lily Chan
2.82 MHz | 1 bit
0:34
4:30
DSD
VOLUMIO
THE AUDIOPHILE MUSIC PLAYER
60
/100
Browse
Playback
Queue

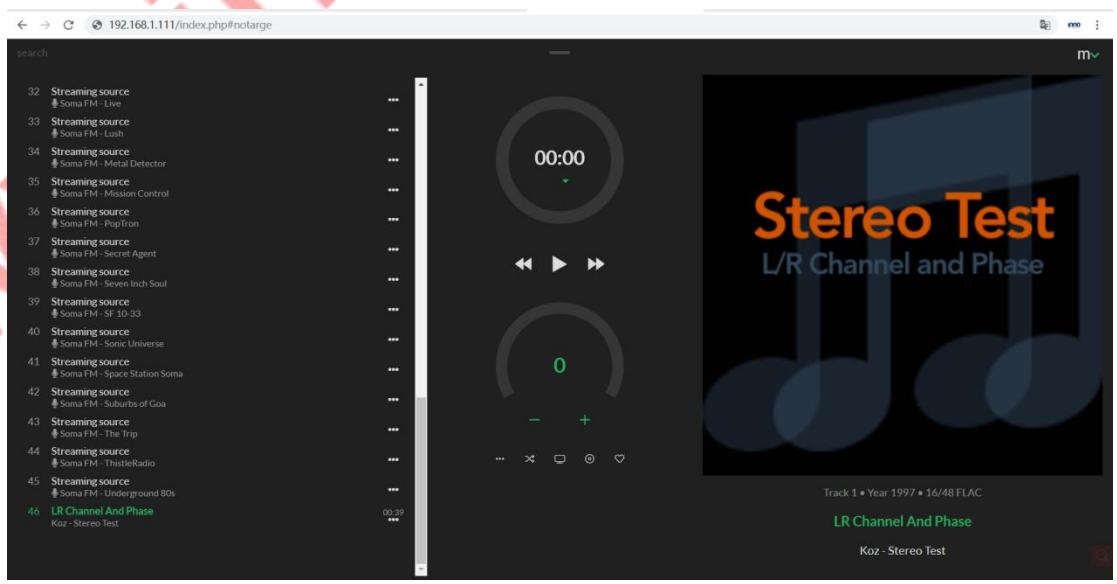
4.6 MoOde Setup

1)We just talk about the basics, for more Information please read the official user manual: https://github.com/moode-player/moode/blob/master/www/setup.txt

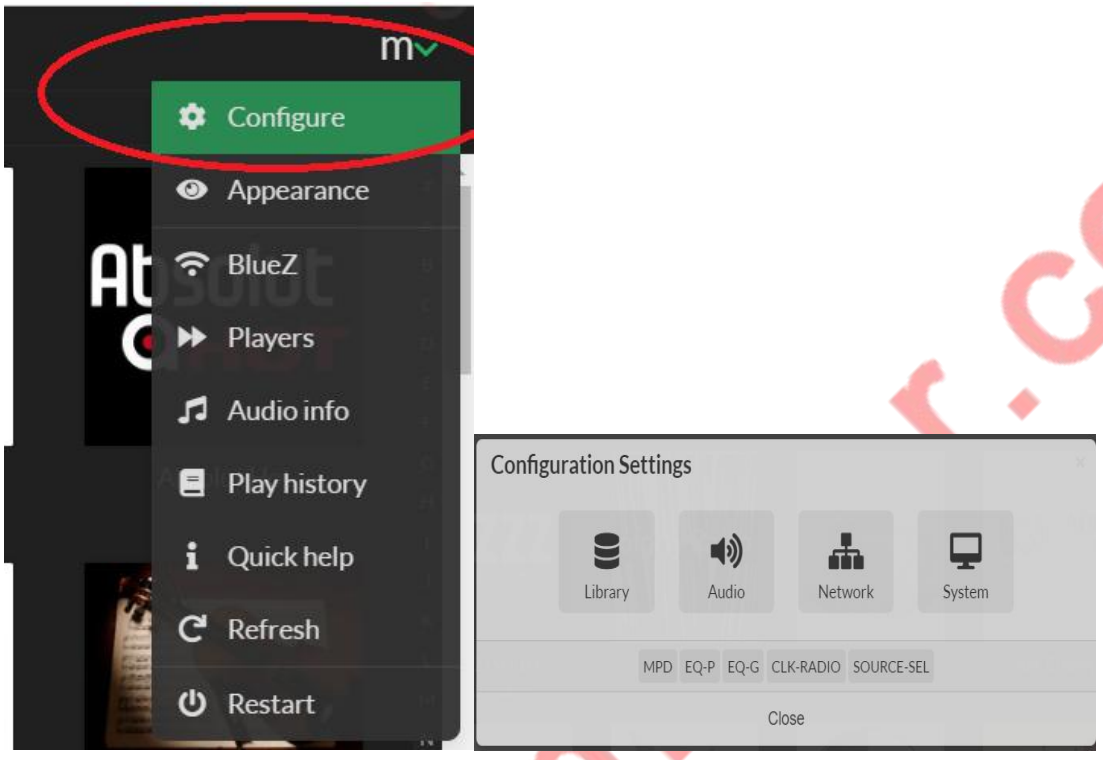
2) Insert the TF card with MoOde image into the Raspberry pi, and then connect to your router by LAN cable, Finally power on. Make sure your Raspberry Pi , Desktop (mobile phones, laptop, pad and so on) in the same local area network(LAN). Get the IP address of Raspberry PI through check up the router or use some IP checker tools.

3)You also use your device(mobile phones, laptop, pad and so on) to connect the hotspot of moode. Named: 'Moode', and Password is 'moodeaudio'. Login page: http://172.24.1.1/

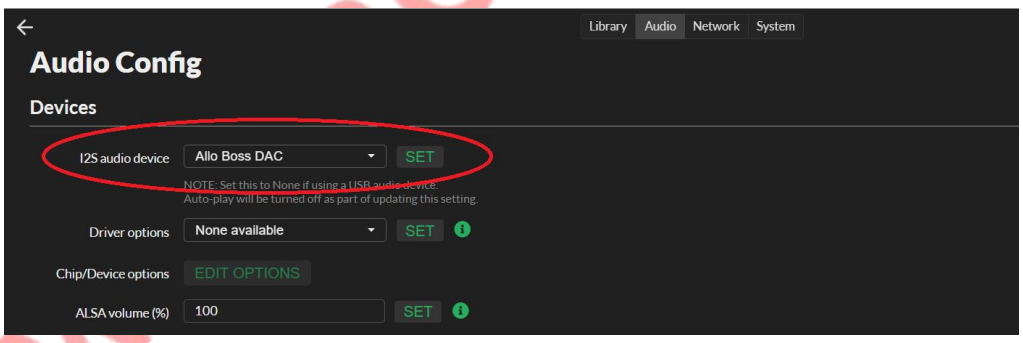
4) Connected the Raspberry Pi through browser. You get the display of Moode.



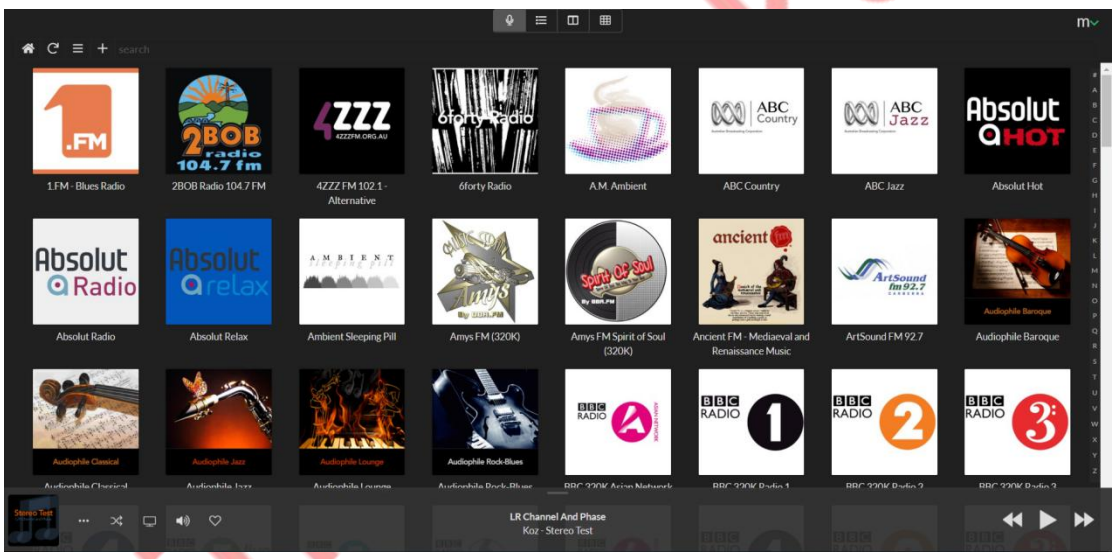
5)Click the icon in the upper righ for setting the system.



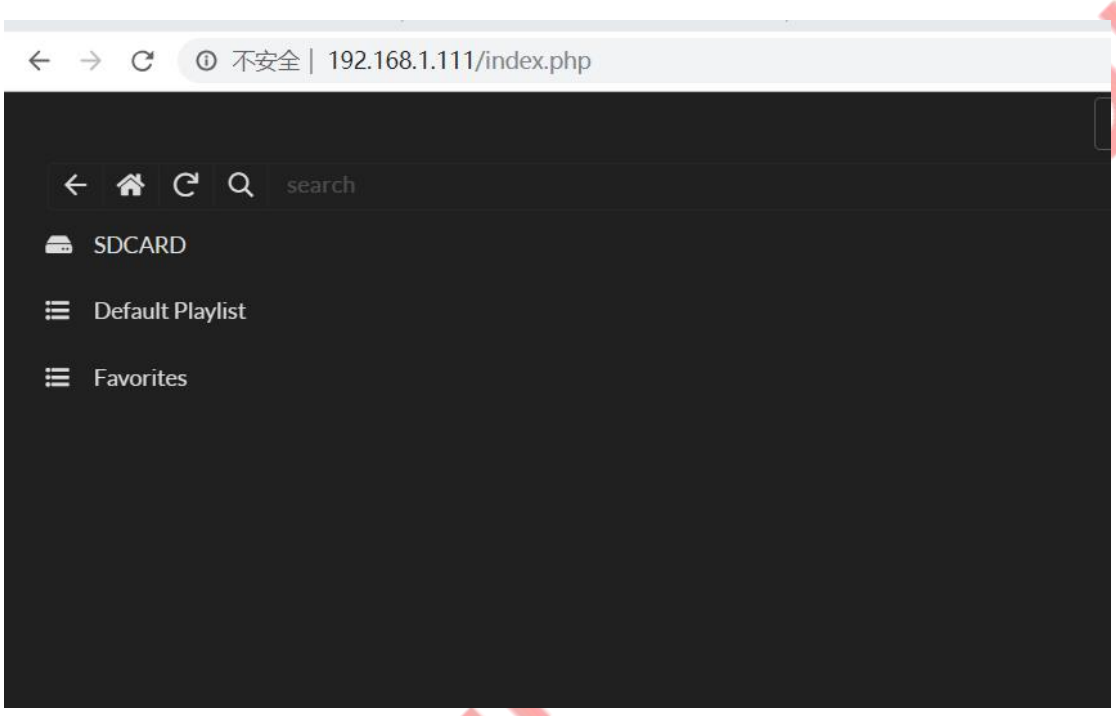
6) Click 'Audio', set as 'Allo Boss DAC' and save and restart. This is an essential step, otherwise you can't hear anything.

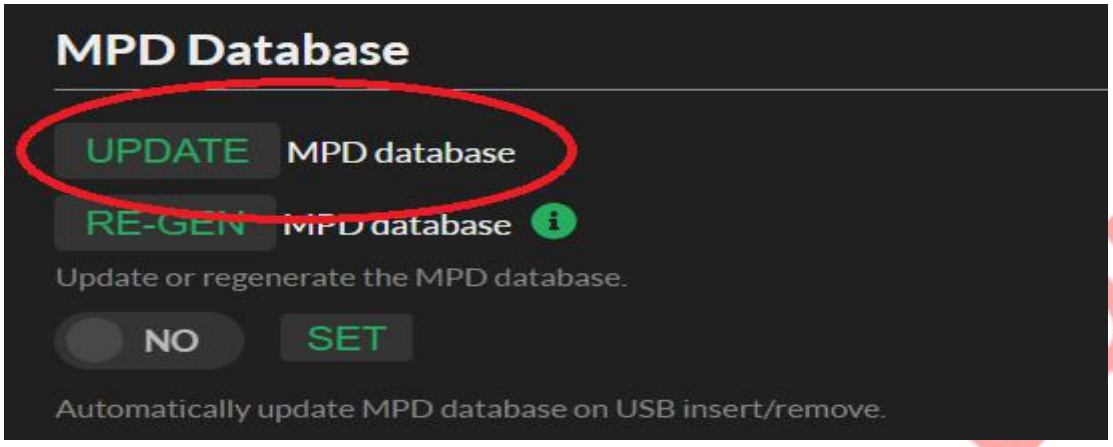


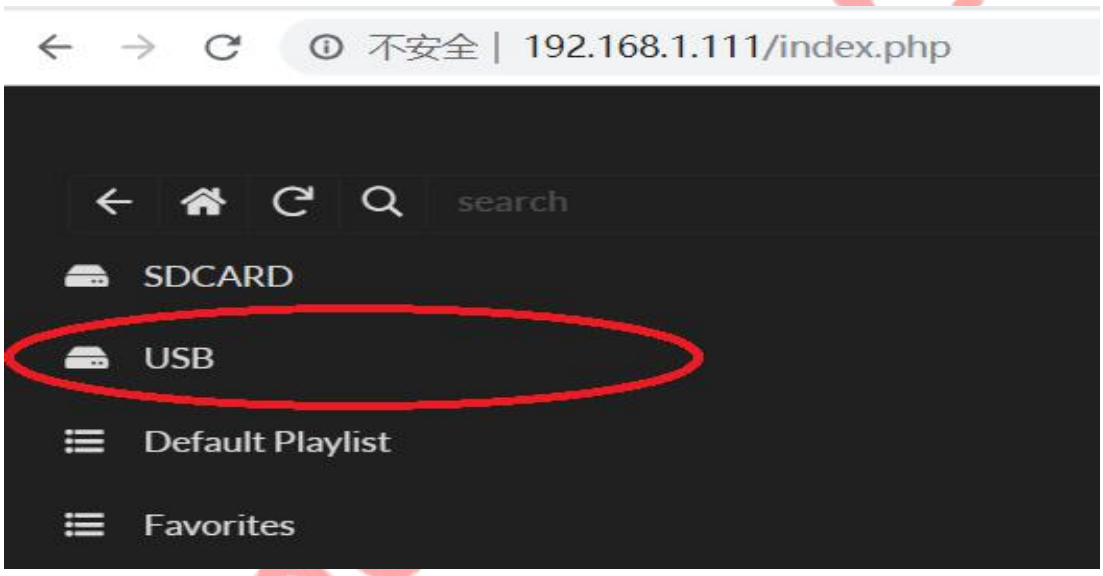
7)Now you can enjoy your music.



8)You can play music in the SD/MMC card, U disk which connected with Raspberry Pi. But Moode may not automatic update disk default, so you need to update by yourself follow these steps.

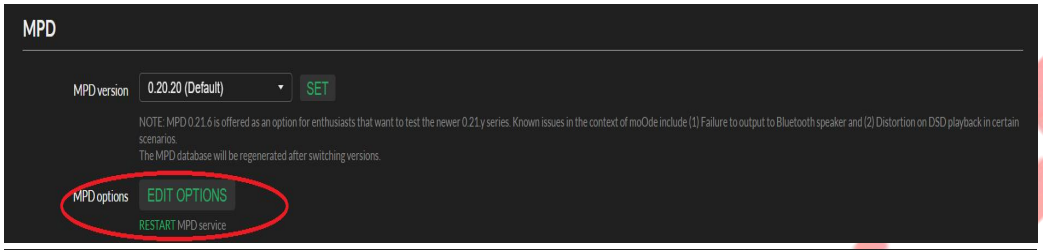


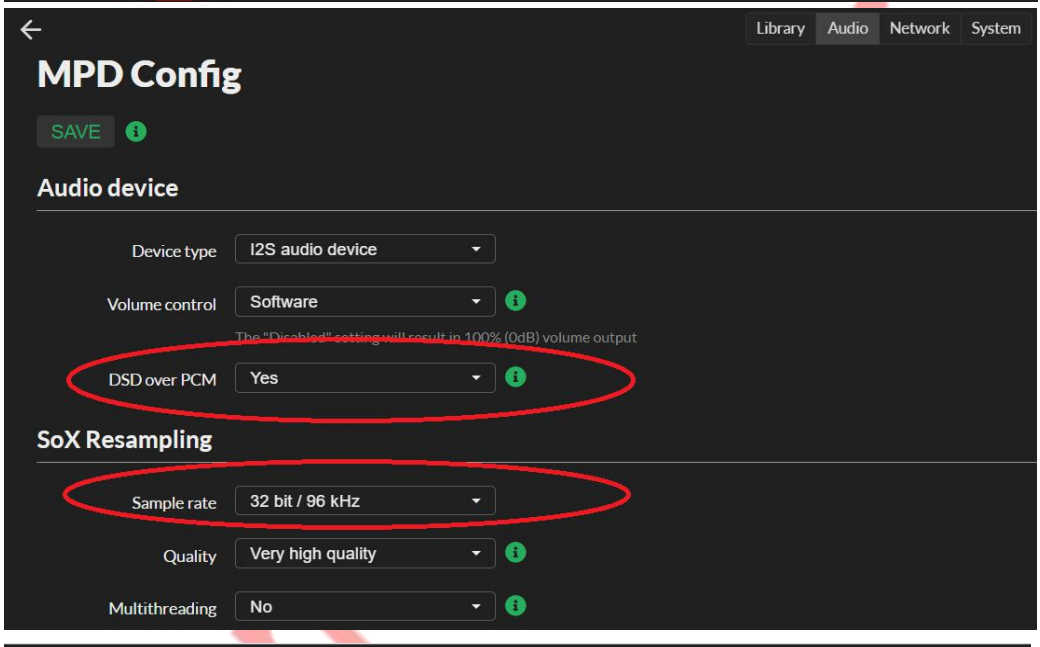

MPD Database
UPDATE MPD database
RE-GEN MPD database
Update or regenerate the MPD database.
NO
SET
Automatically update MPD database on USB insert/remove.

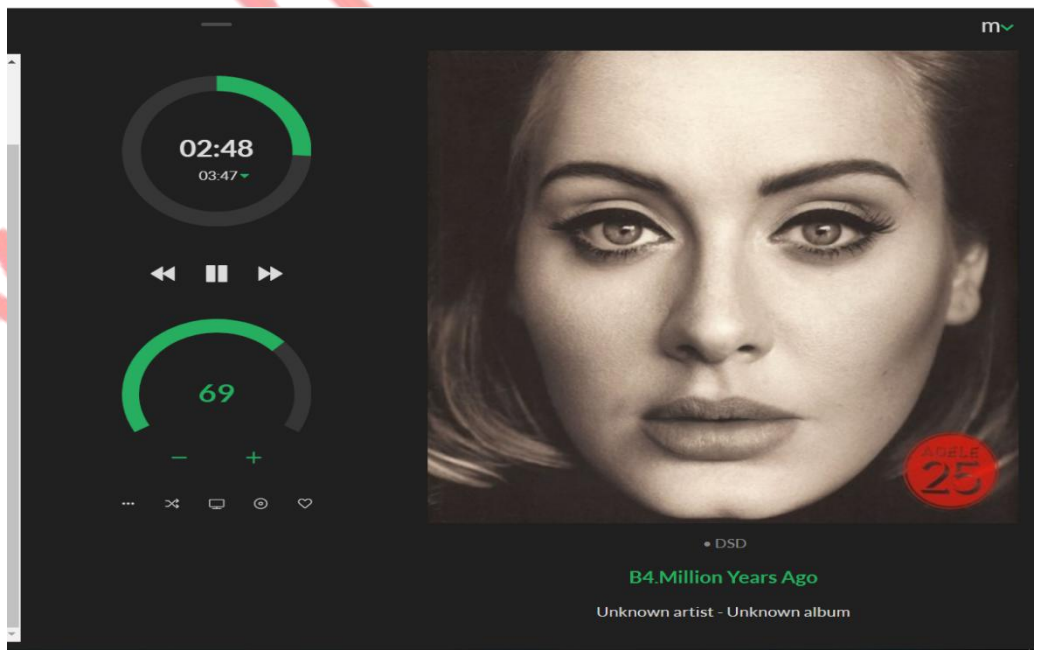

不安全 | 192.168.1.111/index.php
search
SDCARD
USB
Default Playlist
Favorites

4.7 MoOde Play DSD Music Files

Moode is very excellent in play DSD music files.If you want toplay DSD music. In MPD settings, you need to set ”DSD over PCM’ to ‘YES’, and then it’s very important to select the proper Sox resampling rate. Otherwise It dosen’t work well for play DSD music.





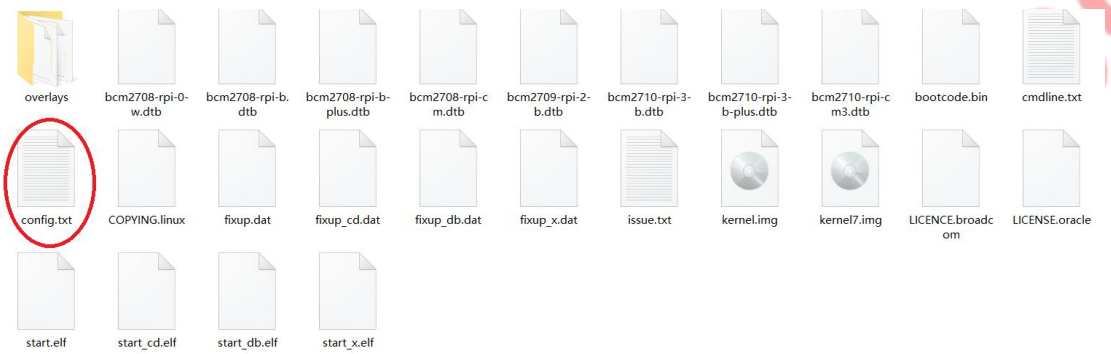


4.8 Raspbian System Setup

1)After load the image onto TF card, Open TF disk directory and Find the file named **config.txt.**

For more information about this file please refer

to :https://www.raspberrypi.org/documentation/configuration/config-txt/



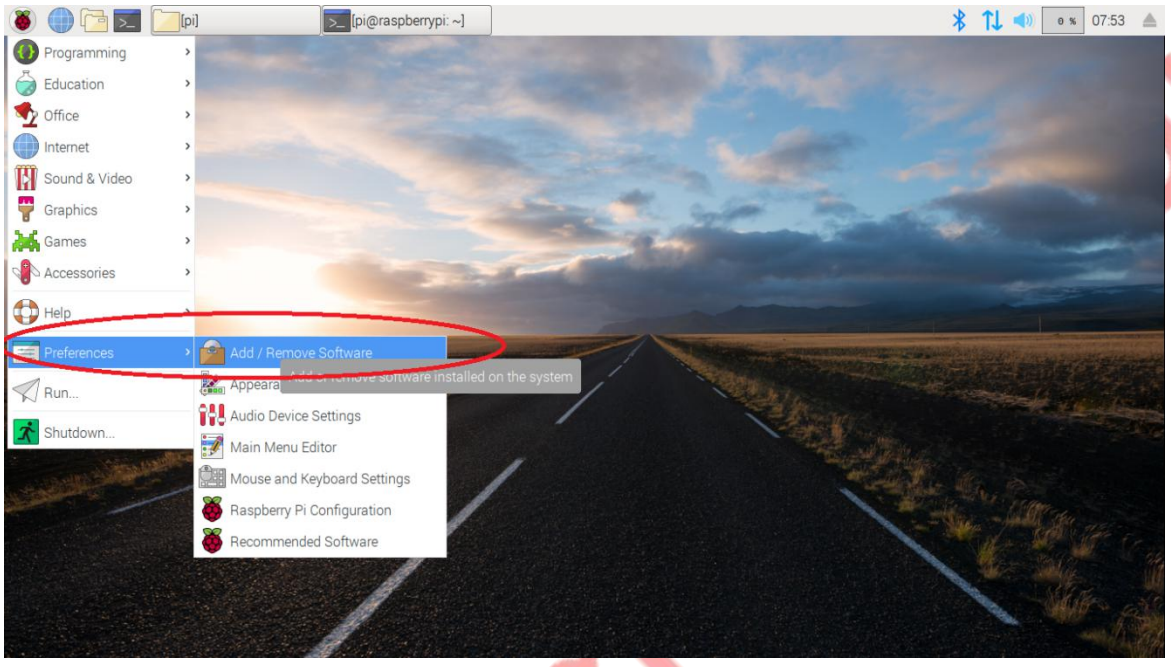
2)Append the following lines to the end of the file,enable the audio module.Notice the format Otherwise it doesn't work.

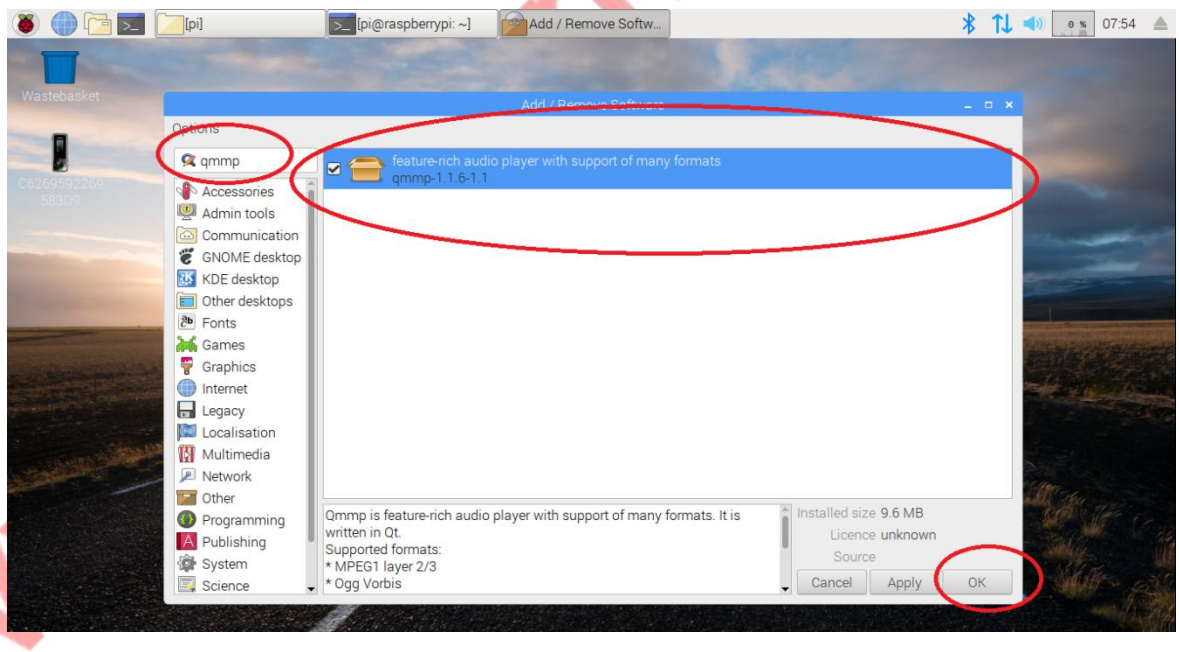
dtoverlay=allo-boss-dac-pcm512x-audio

```
# Uncomment some or all of these to enable the optional hardware interfaces
#dtparam=i2c_arm=on
#dtparam=i2s=on
#dtparam=spi=on

# Uncomment this to enable the lirc-rpi module
#dtoverlay=lirc-rpi

# Additional overlays and parameters are documented /boot/overlays/README

# Enable audio (loads snd_bcm2835)
dtparam=audio=on

dtoverlay=allo-boss-dac-pcm512x-audio
```

3)Insert the TF card with volumio image into the Raspberry pi then power on. Default user name is **pi**, and password is **raspberry**;

4)After login, Install the qmmp music player. Before that please make sure your raspberry already connected to the internet.

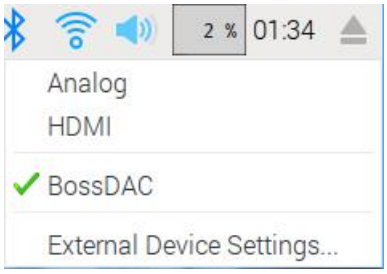




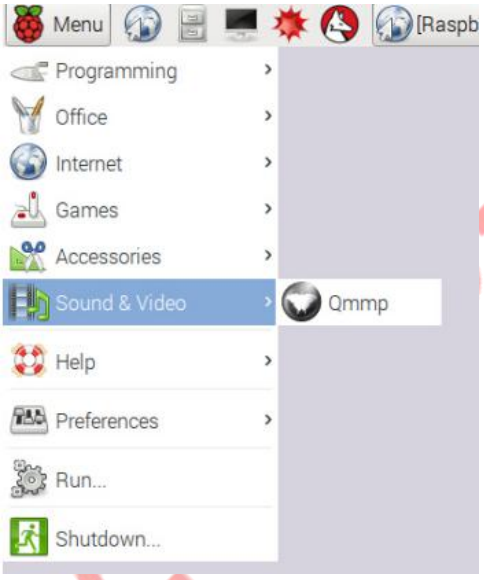
5)You can also install it by below command to setup qmmp.

```
sudo apt-get install qmmp.
```

6)Right click the sound icon on the top right corner, set the raspberry pi audio output as 'BossDAC' . This is an essential step, otherwise you can't hear anything.



7)After the installation is,we can find the player under the menu bar. You can Install other linux music player as same step. Such as Rhythmbox, Amarok,VLC,Cmus and so on.

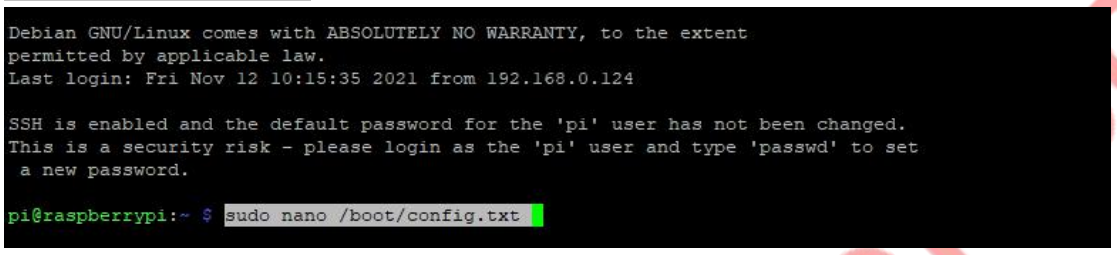


4.9 Raspbian Lite SetUp

1) Modify the config.txt

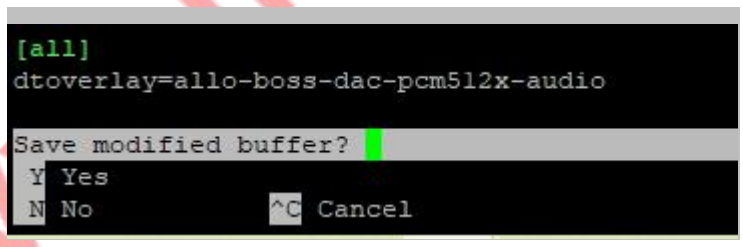
Open the config.txt in system.

sudo nano /boot/config.txt



Append the following lines to the end of the file,enable the audio module.Draw attention to the format , Otherwise it doesn't work. press "ctrl+o" and press "Enter" to save the file. Reboot the system.

dtoverlay=allo-boss-dac-pcm512x-audio



2)Check the DAC module

Type in the commands that are shown below. You can see the BossDAC, the **3** is the dac device number.

aplay -l

cat /proc/asound/cards

```
pi@raspberrypi:~ $ aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: Headphones [bcm2835 Headphones], device 0: bcm2835 Headphones [bcm2835 H
eadphones]
  Subdevices: 8/8
  Subdevice #0: subdevice #0
  Subdevice #1: subdevice #1
  Subdevice #2: subdevice #2
  Subdevice #3: subdevice #3
  Subdevice #4: subdevice #4
  Subdevice #5: subdevice #5
  Subdevice #6: subdevice #6
  Subdevice #7: subdevice #7
card 1: vc4hdmi0 [vc4-hdmi-0], device 0: MAI PCM i2s-hifi-0 [MAI PCM i2s-hifi-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 2: vc4hdmi1 [vc4-hdmi-1], device 0: MAI PCM i2s-hifi-0 [MAI PCM i2s-hifi-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 3: BossDAC [BossDAC], device 0: Boss DAC HiFi [Master] pcm512x-hifi-0 [Boss
 DAC HiFi [Master] pcm512x-hifi-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
```

```
pi@raspberrypi:~ $ cat /proc/asound/cards
 0 [Headphones     ]: bcm2835_headpho - bcm2835 Headphones
                      bcm2835 Headphones
 1 [vc4hdmi0       ]: vc4-hdmi - vc4-hdmi-0
                      vc4-hdmi-0
 2 [vc4hdmi1       ]: vc4-hdmi - vc4-hdmi-1
                      vc4-hdmi-1
 3 [BossDAC        ]: BossDAC - BossDAC
                      BossDAC
pi@raspberrypi:~ $
```

3) Set as default sound card.

Create /etc/asound.conf

sudo nano /etc/asound.conf

```
pi@raspberrypi:~ $ sudo nano /etc/asound.conf
```

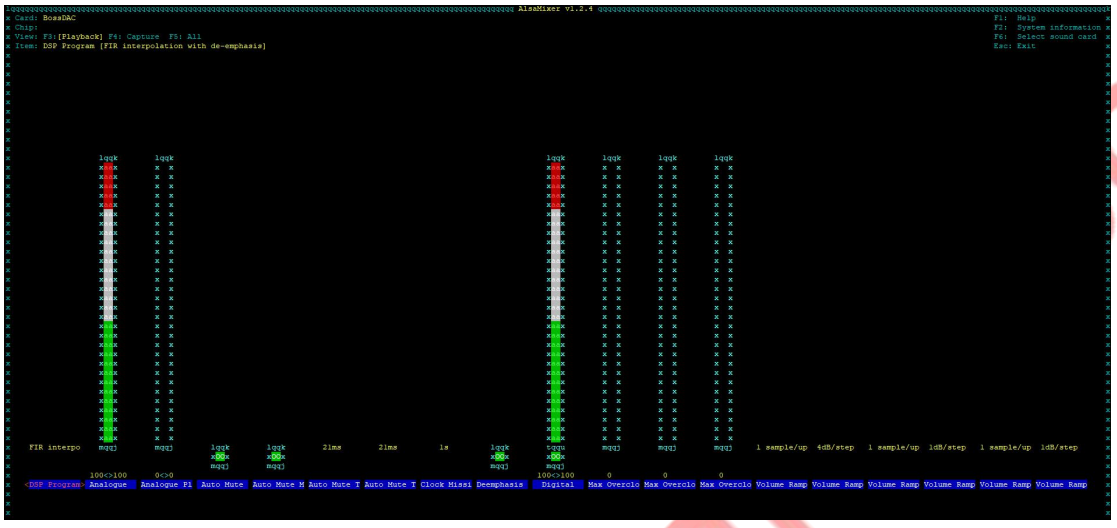
Type in the following content and then press "ctrl+o" and press "Enter" to save the file. Reboot again. 3 is the DAC module device number.

```
  GNU nano 5.4                    /etc/asound.conf *
pcm.!default  {
 type hw card 3
}
ctl.!default {
 type hw card 3
}

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

4) Alsamixer

Type in the commands that are shown below, you can see the alsamixer tool.

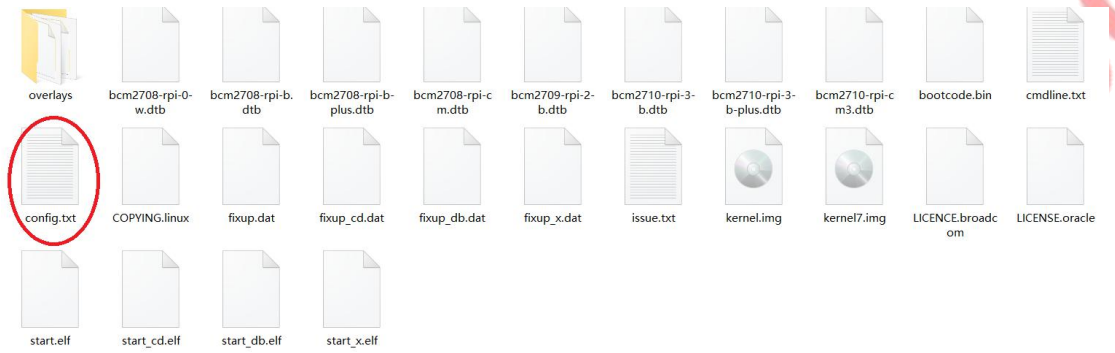
```
alsamixer
```



4.10 LibreELEC Setup

1) Modify the config.txt

After load the LibreELEC image into the TF card, Open TF disk directory on your computer and check the file named config.txt. For more information about this file please refer to : https://www.raspberrypi.org/documentation/configuration/config-txt/

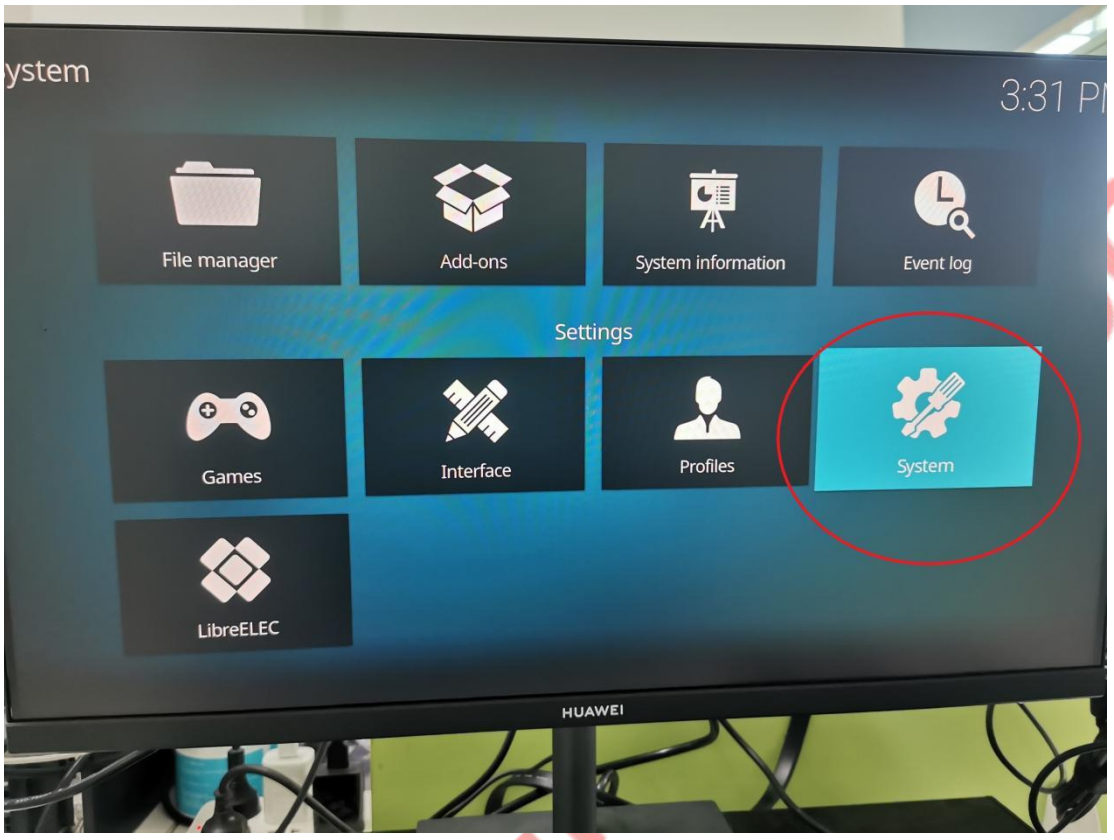


Append the following lines to the end of the file,enable the audio module.Draw attention to the format , Otherwise it doesn't work.

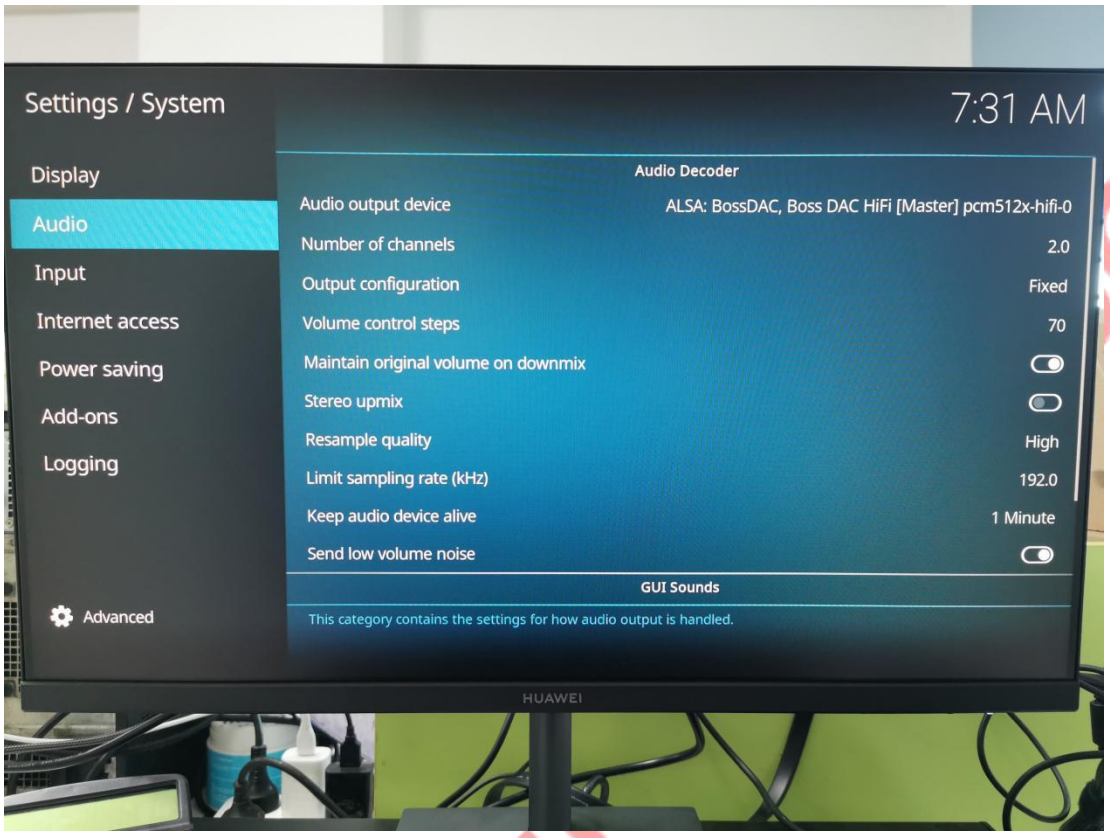
```
dtoverlay=allo-boss-dac-pcm512x-audio
```

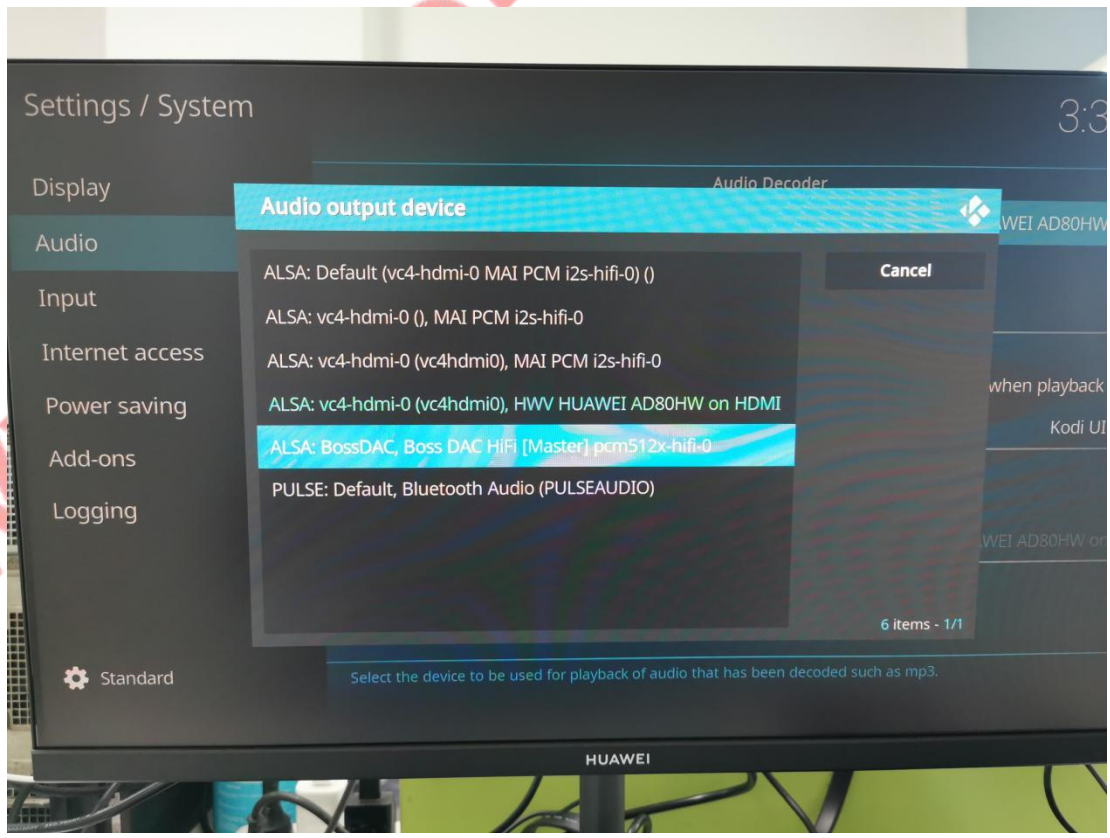
```
############################################################
# Include distribution specific config file if it exists.
############################################################
[all]
include distroconfig.txt

# uncomment to enable infrared remote recevier connected to GPIO 18
#dtoverlay=gpio-ir,gpio_pin=18
dtoverlay=allo-boss-dac-pcm512x-audio
```

2)Open the system page on LibreELEC



3) Set the Audio output device as BossDAC.





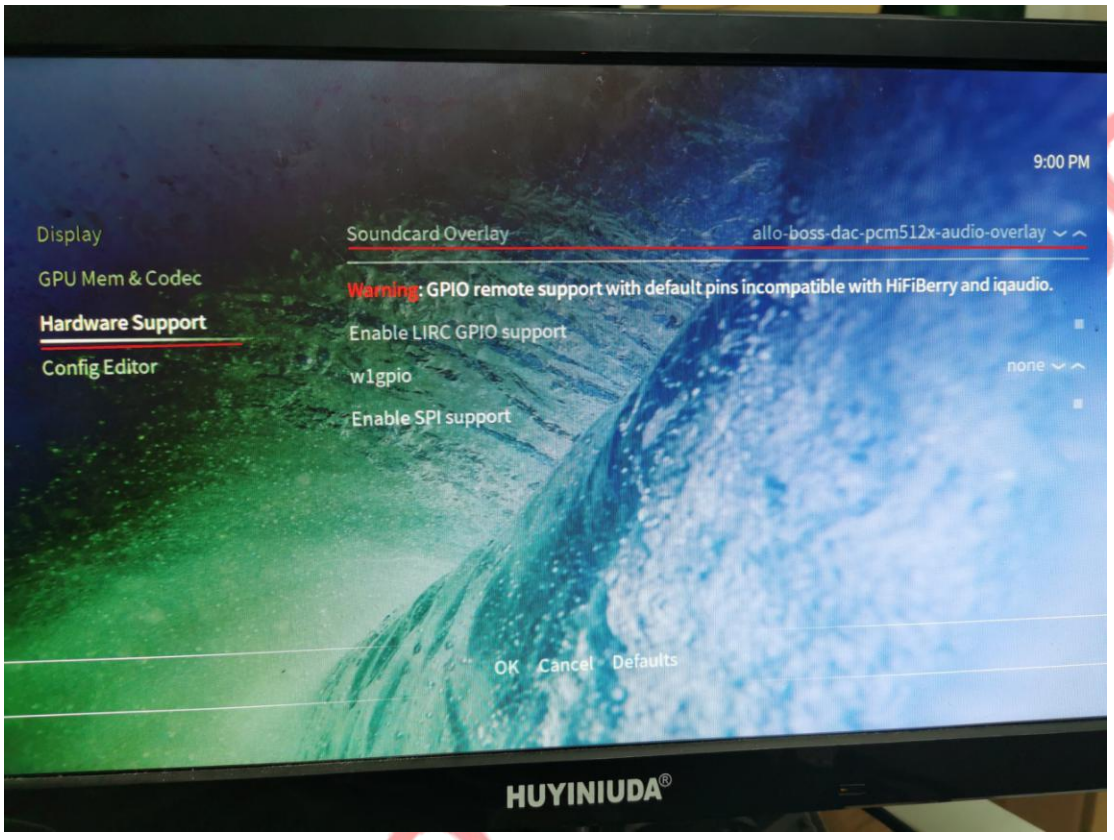
4.11 OSMC Setup

1) Insert the TF card with OSMC image into the Raspberry pi, and then connect a HDMI Display, Finally power on it. You will see the install GUI.

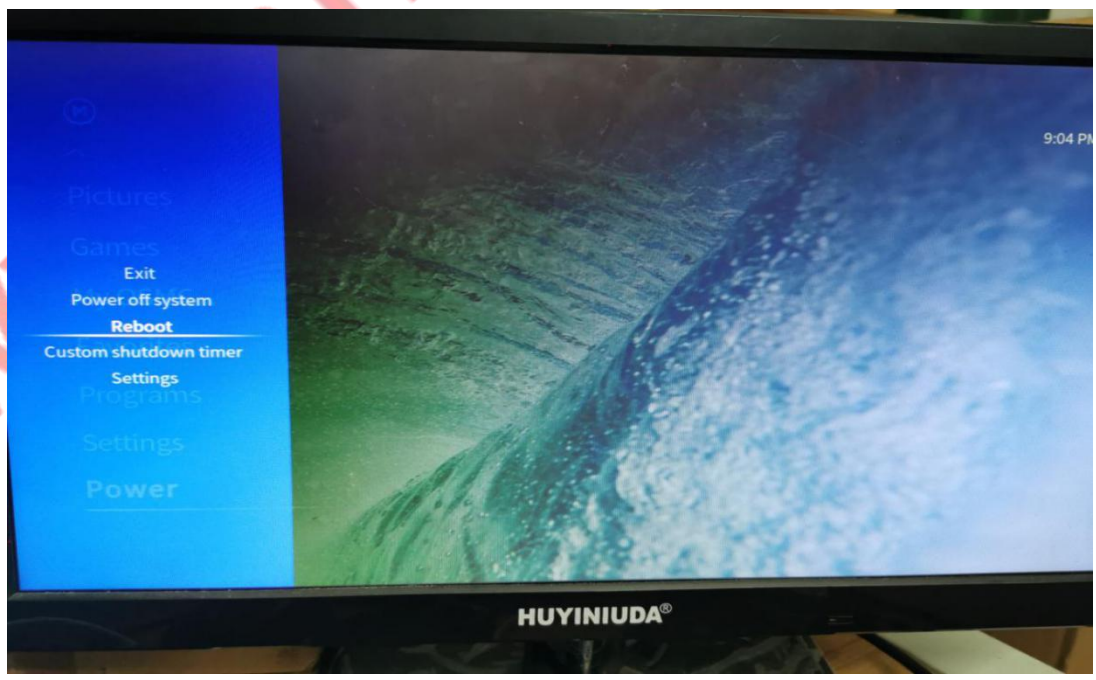
2)After some basic setup you will go to the home page.

5) Click 'My OSMC' ➞ 'Pi Config'.

6) Click ‘Hardware Support’, set Soundcard Overlay ‘all-boss-dac-pcm512x-audio-overlay’.Do not enable any other options.

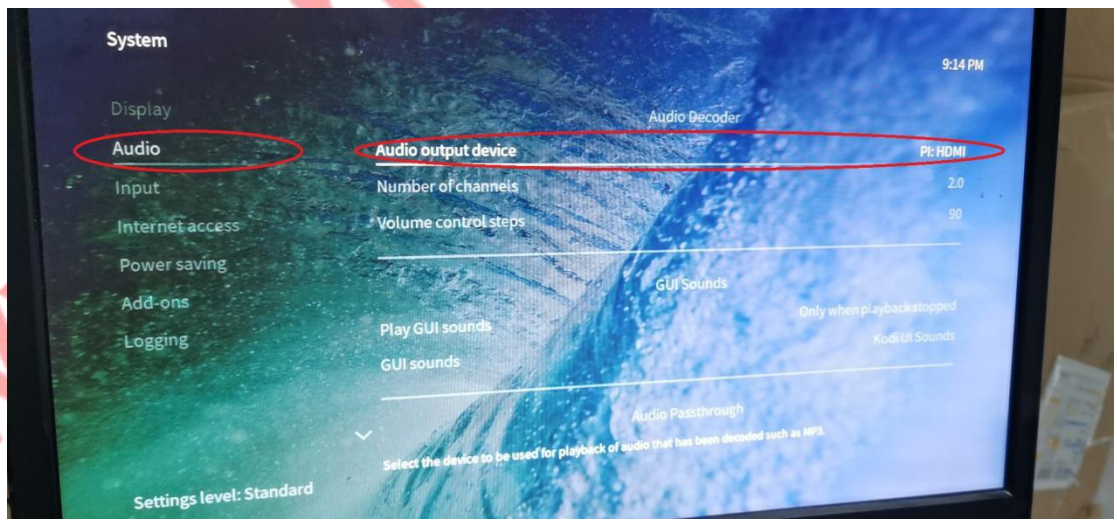


7) Back to home page. Click ‘Power’ → ‘Reboot’

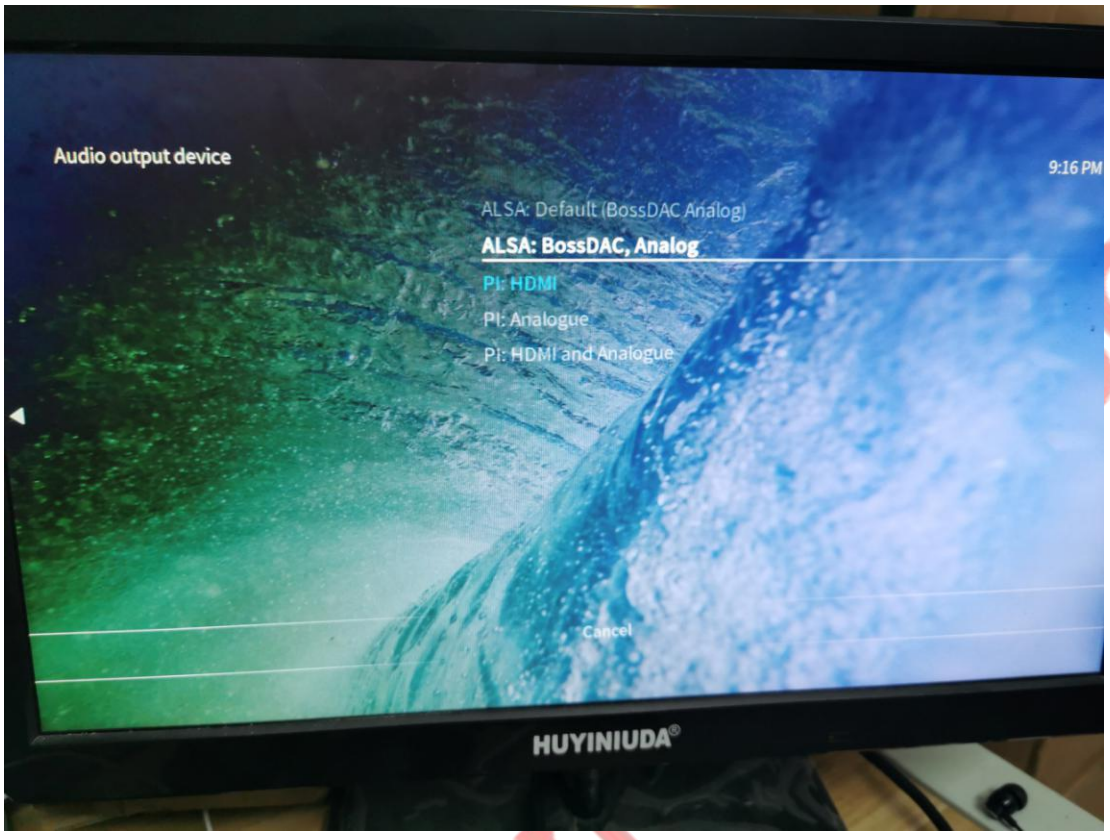


8) After restart. Click ‘Settings’→’System’

9) Click ‘Audio’→’Audio output device’.



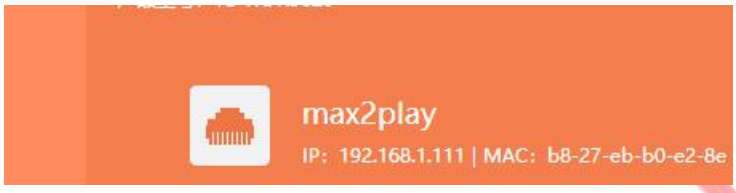
10) Choose Audio output device as 'BossDAC, Analog'. And then reboot again.



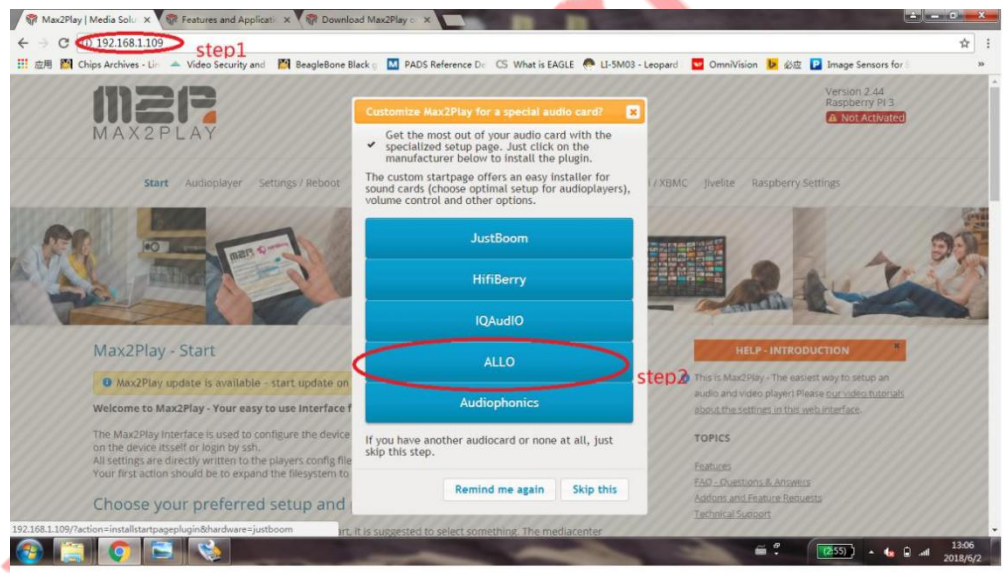
11) After that, The setting has been completed. you can hear the click voice of the mouse, and you can listen to music ,watch movie and play game normally.

4.12 Max2player

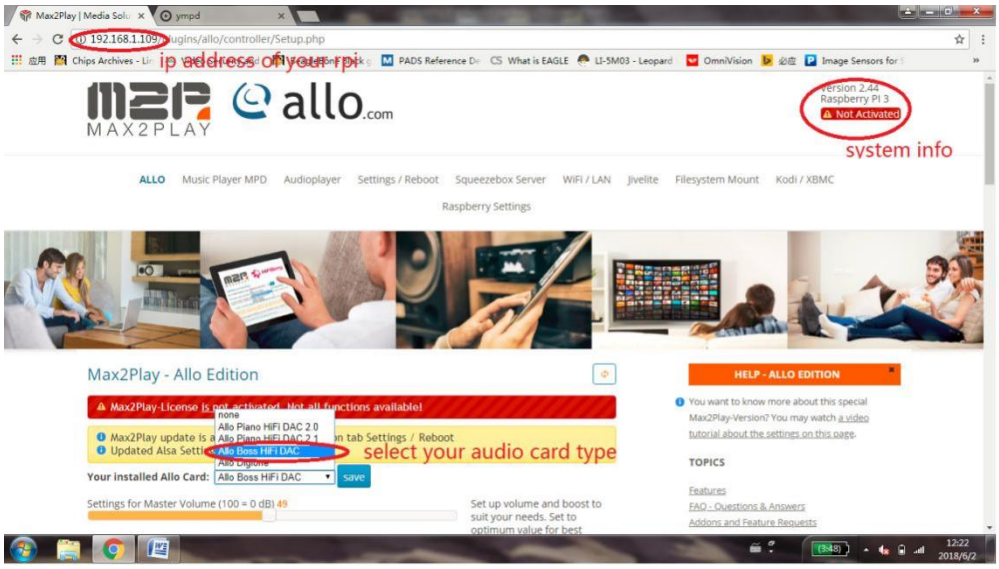
1) Insert the TF card with Max2player image into the Raspberry pi, and then connect to your router by LAN cable, Finally power on. Make sure your Raspberry Pi , Desktop (mobile phones, laptop, pad and so on) are in the same local area network(LAN). Get the IP address of Raspberry PI through check up the router or use some IP checker tools.



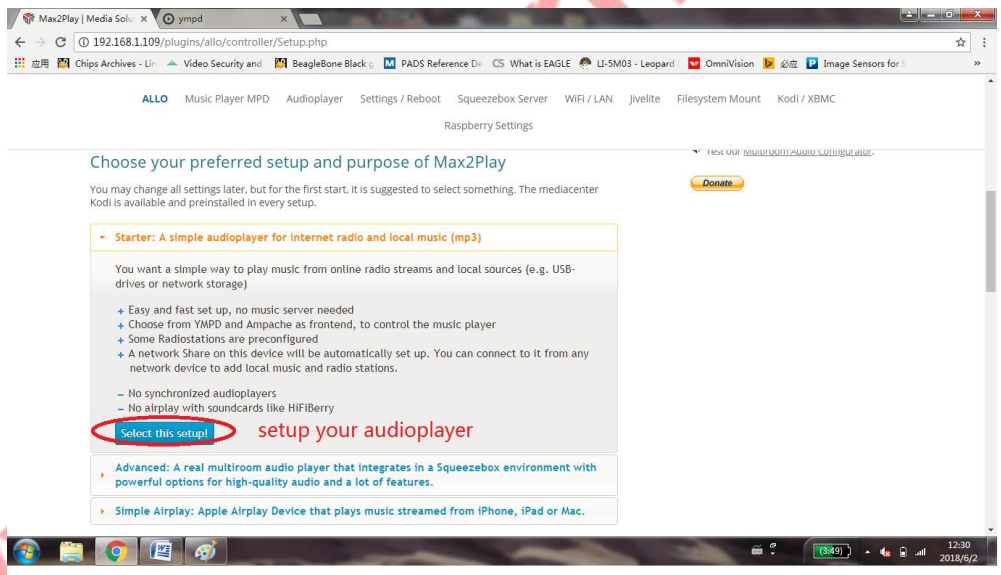
2)Choose the Card option as 'Allo'.

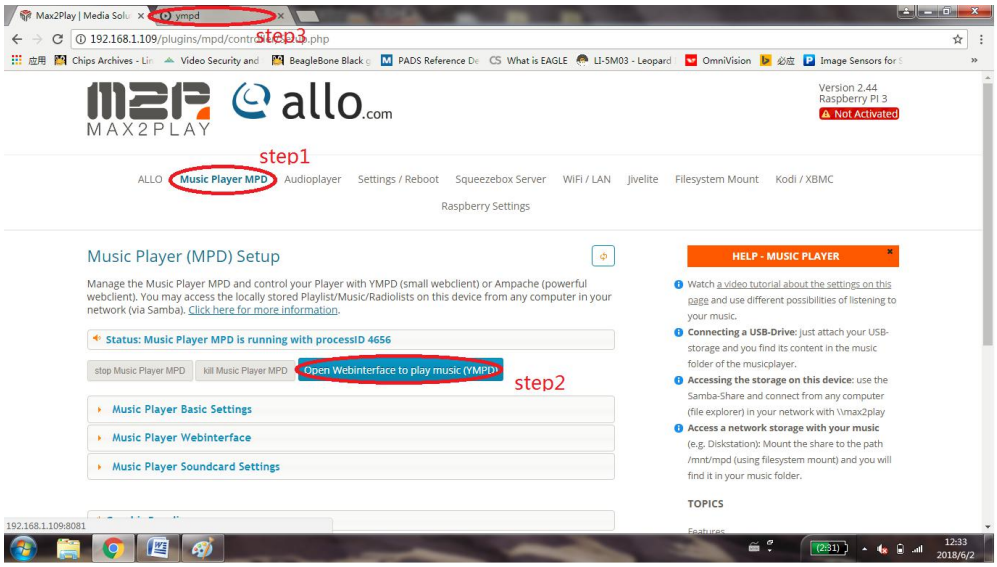


3)Setup the audio card type as below, then save and reboot the system.

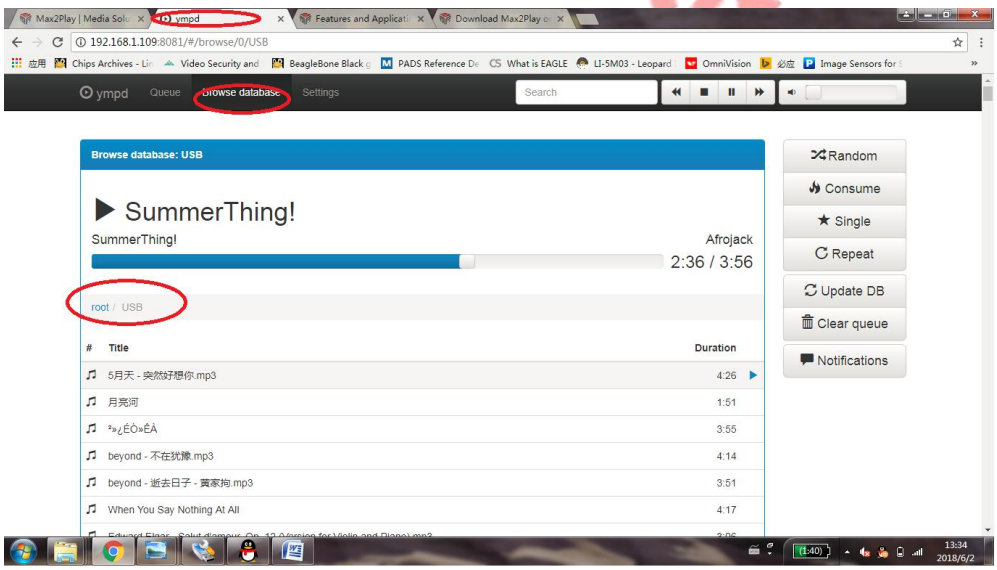


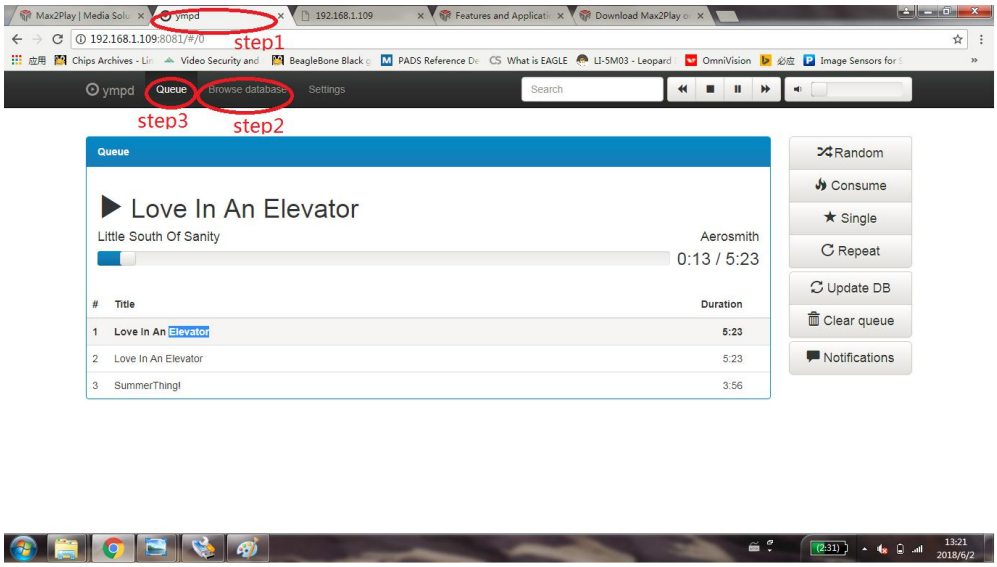
4)Setup your audio player.





5)Add music file

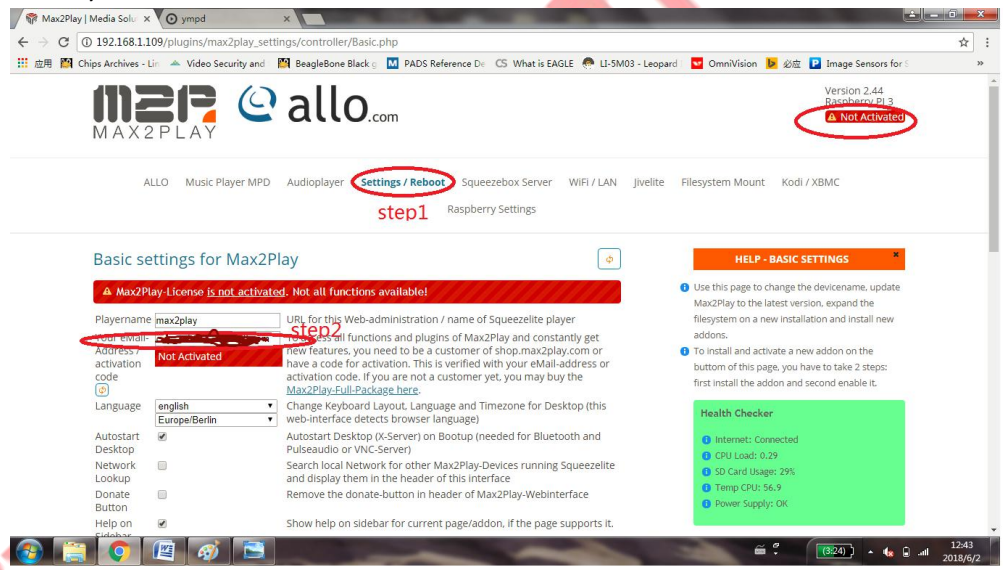




6)Note

By default Max2play License is not activated . not all functions available!

Active your license:



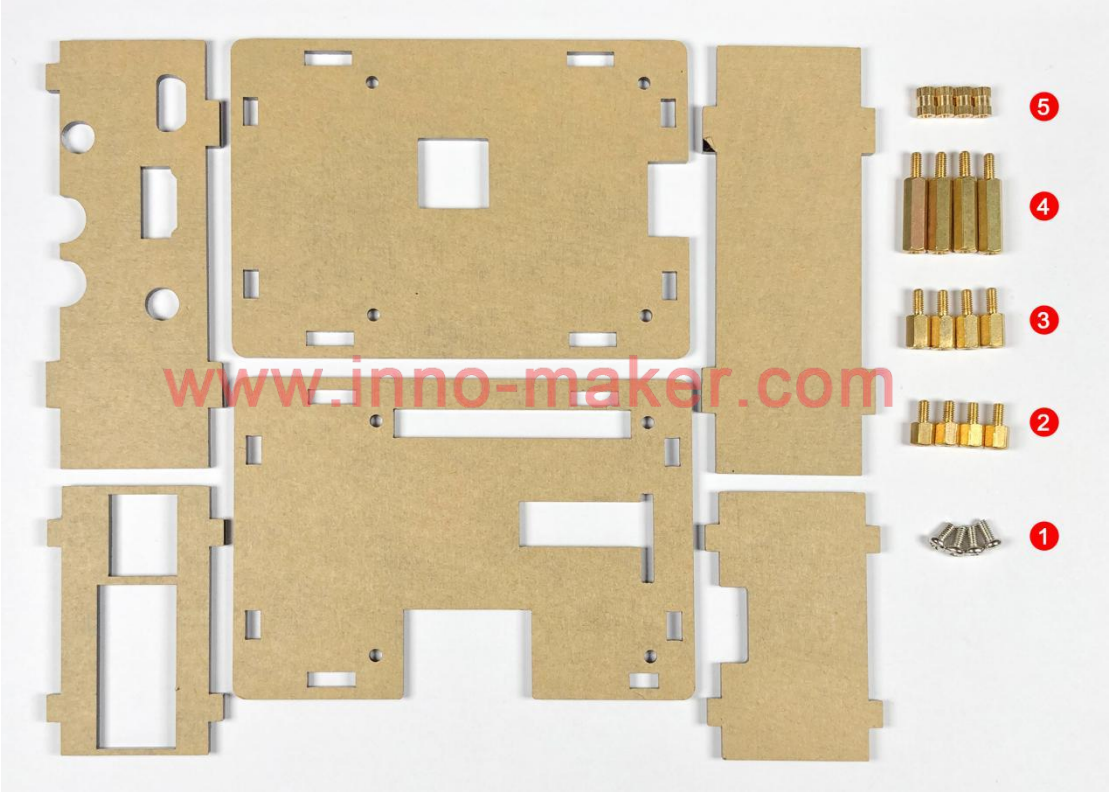
5. DAC CASE ASSEMBLY

Customer can also buy Case For HIFI DAC,customer can buy and assemble it as below： d

1) Unpack it.

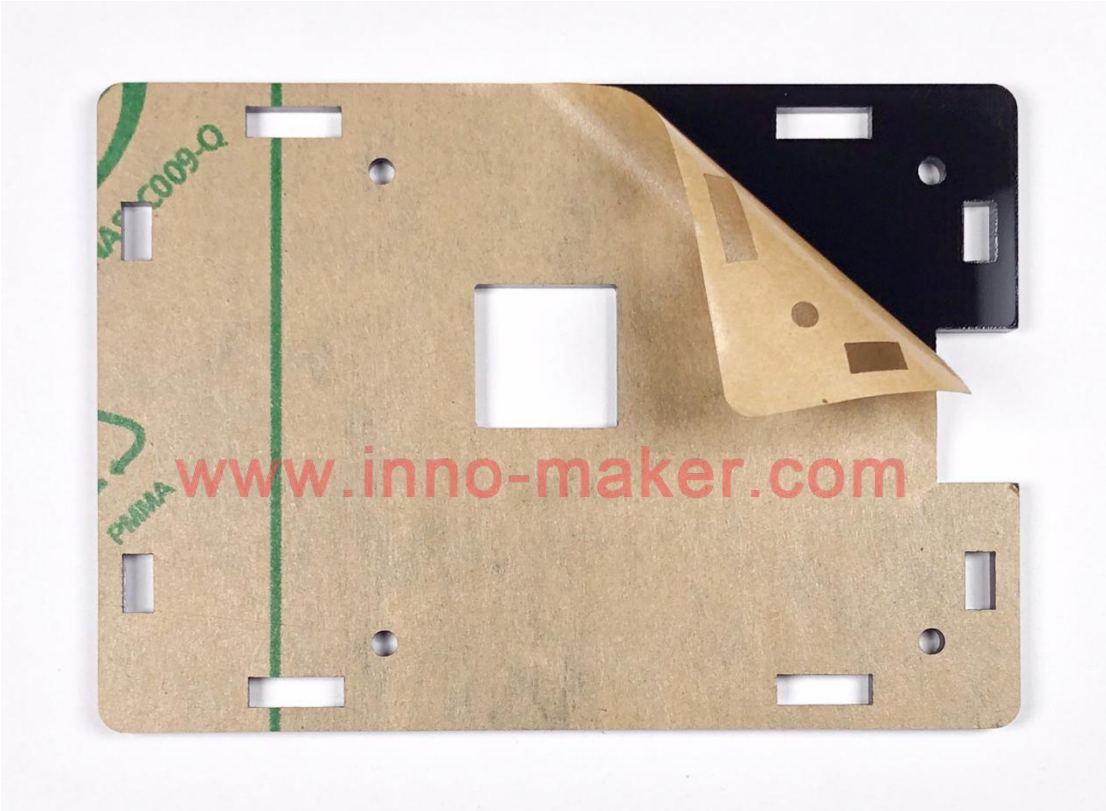
Package contain :

1. 6 pcs acrylic plate
2. 5 groups of screw
3. 1 screwdriver

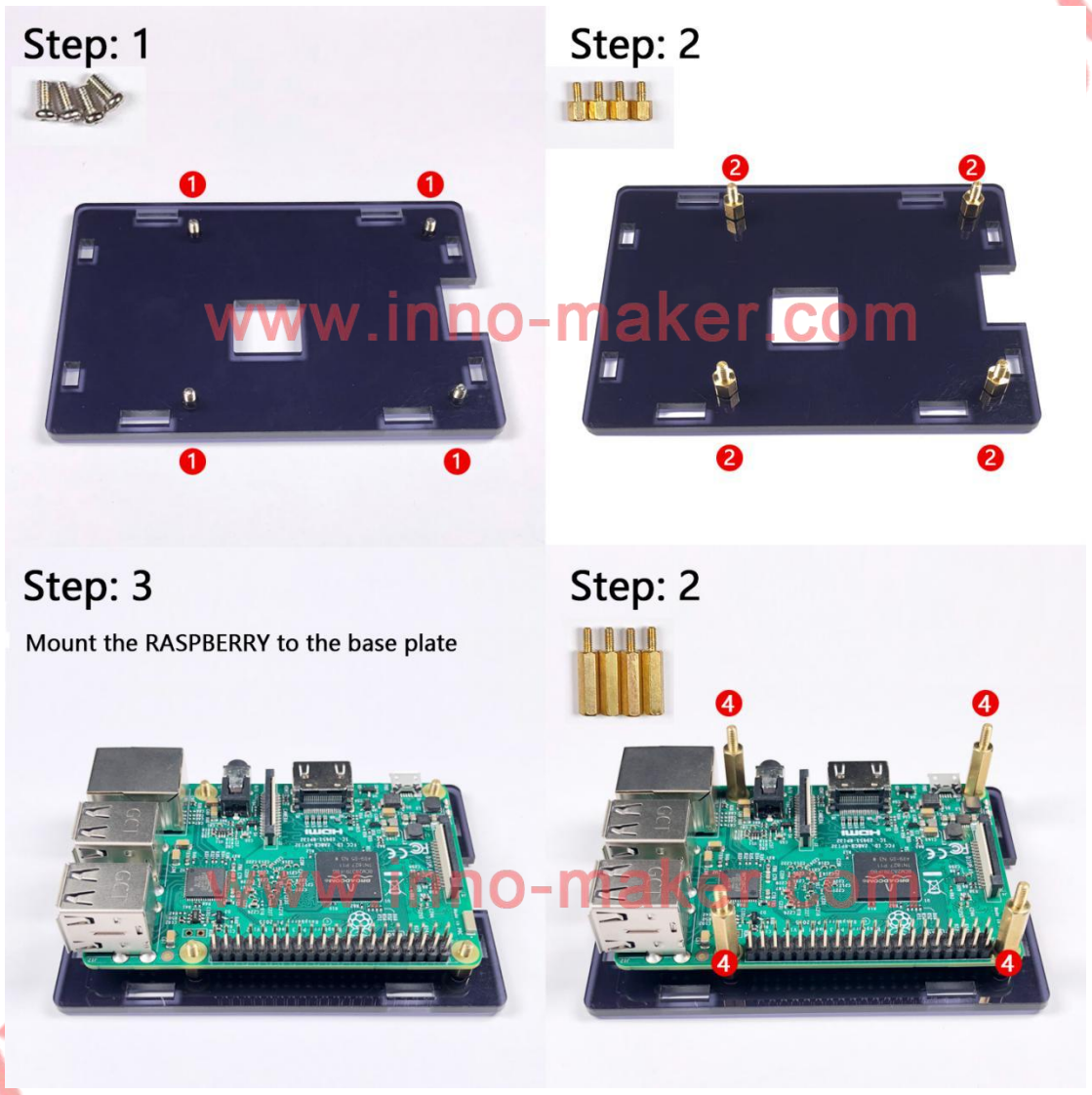


2) Peel the protection film

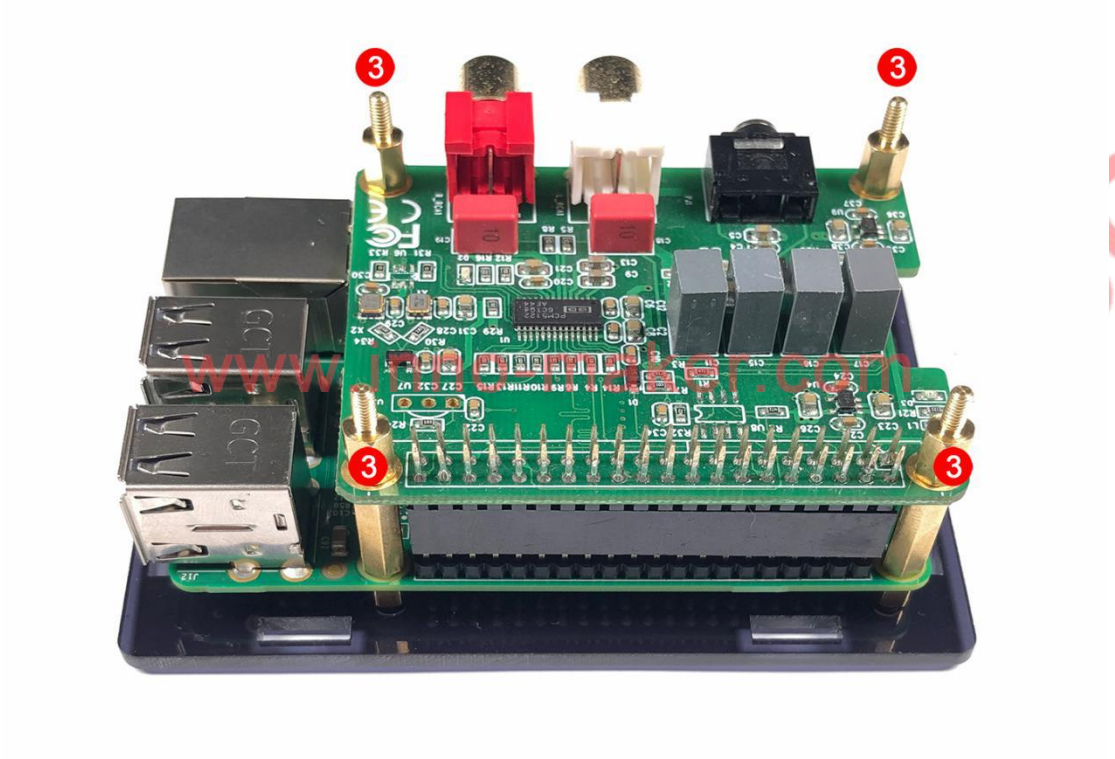
There is a protection film on both sides of all acrylic plate. You need to peel it off before assembling the case.



3) Mount the RASPBERRY to the base plate.Please pay attention to the group number.

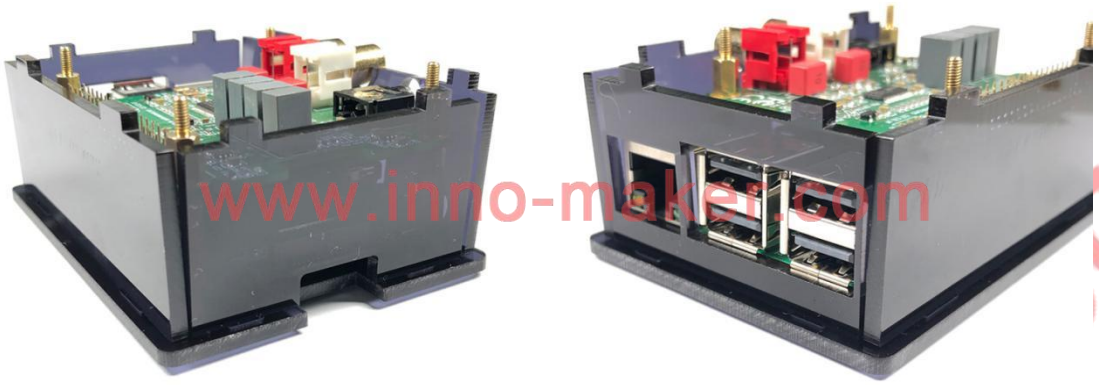


4) Plug the DAC module into the 40 pin GPIO head.



5) Add two long side plates.

6) Add two short side plates.



7) Add top plate and screw down.

6. Display

We have two kinds display support the DAC module for user DIY. You can find these two lcd from our website, wiki and Amazon store.

6.1 The 3.5 Inch Capacitive Touch Lcd

This 3.5 inch capacitive touch lcd only support the Raspbian now. No support Volumio, Moode system.

6.2 The 7 Inch Capacitive Touch Lcd

The 7 inch capacitive touch lcd is a plug and play device, Power supply and capacitance touch signal via one USB port and display signal via the HDMI of Raspberry Pi. Compatible with Raspbian, Volumio, Moode etc that the system support HDIM output.